REGIONAL ALLERGY OF THE UNITED STATES, CANADA, MEXICO AND CUBA

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Edited by

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REGIONAL ALLERGY

of the

United States, Canada, Mexico and Cuba

A Symposium of Thirty-nine Contributors

Edited by

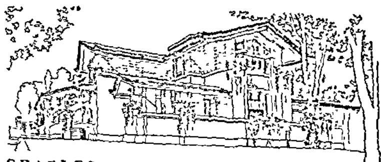
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Preface

IT IS INTERESTING to speculate about the difference in practicing allergy in Europe and in the United States. Until the recent upheaval, Europeans, once settled, clung to the same allergenic environment with astounding tenacity. Sons and daughters left home and took up roots elsewhere, but rarely went far afield from the ancestral domain It is true that the same tendency to remain where one was born can be found in the rural sections of this country, in mountain valleys, and on river banks, but as a whole, freedom of movement has, from the very beginning, been a part of American life. Free homesteads and the lure of gold in California have only given way to more urgent incentives to family migration. The shifting industrial pattern of the country has made camp followers out of large sections of the population—trailer villages frequently precede permanent housing at sites near which new factories are being built and staffed The relative ease with which people traveled during the war years has emphasized the existing trend to cover a great deal of varied ground during brief vacations and to select eventually the more comfortable and temperate regions of the country as a final abode. Florida and California have become favored sections for retiring Americans

A considerable number of these citizens on the move are allergic citizens In fact we must assume that 10 to 30% have either manifest or latent allergic symptoms at one time or another Consequently the question, "What will this—my husband's transfer, our son's leaving for a college in Texas, or the acre of land which we have bought in Rancho Santa Fe—do to his allergy?" has become increasingly common in physician's offices throughout the United States. These assembled monographs attempt to clarify some of the most common points in doubt.

Like an allergic survey of an individual, the survey of a region is bound to be incomplete Its major characteristics will

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Like an allergic survey of an individual, the survey of a region is bound to be incomplete. Its major characteristics will

become readily apparent and can be effectively classified: only few parts of the country remain where field studies of allergen-producing flora have not been observed and recorded and where air-borne pollen and molds have not been counted at various times. Progress continues, supported by effective leadership of The Pollen Survey Committee of the Council on Aeroallergens of The American Academy of Allergy. Pollen and molds, however, are only one factor in the allergic potential of a region: weather and the prevailing winds, the humidity of the area, the location of the natural barriers, to name a few, are indeed important parts of the allergenic environment which in the end determines the clinical response of the allergic individual.

The editors have felt that a survey of each region should be introduced by brief notes on its geographical relief, and on its social structure, to acquaint physicians and patients, at least in broad terms, with the territory in which they are to live. We have divided the map roughly into allergenic areas and have often disregarded the political borderlines of counties and states—even the national boundary so as to include Eastern and Western Canada, parts of Alaska, Mexico and Cuba which are favored vacation lands

It has been our editorial policy to give free hand to our large group of distinguished contributors. Each of the authors is a practicing allergist familiar with all the aspects of allergy in the region which he has covered We have attempted to accomplish a limited uniformity of the contributions which would not destroy the individuality of each chapter, yet would permit easy cross reference for practical purposes. The continuous cooperation and counsel afforded us by the contributors has been inspiring If the volume is successful in its attempt to present a faithful outline of the pattern of allergy in the United States and its neighboring countries, it owes its success to their interest and their generosity.

MAX SAMTER
OREN C DURHAM

Chicago, Illinois

A Note About Nomenclature

No attempt has been made by the editors to unify the slight and mostly unimportant differences in botanical terminology used by the different authors. Some have used common names only, others both common and botanical names. The following weed and grass names may be useful in case of difficulty in identification of the species discussed:

Short ragweed. This plant has two accepted botanical names, *Ambrosia elatior* and *Ambrosia artemisiifolia*, and many local names common ragweed, low ragweed, dwarf ragweed, small ragweed.

Burweed marsh elder This plant also has two accepted botanical names, *Iva xanthifolia* and *Cyclachaena xanthifolia*. The local names include, carelessweed, horseweed, tall poverty weed and prairie ragweed.

Bluegrass, *Poa pratensis*. West of the Appalachians this common grass of meadows and lawns is widely known as *bluegrass* or as Kentucky bluegrass, to distinguish it from more than 30 other *Poa* species such as, Canada bluegrass, annual bluegrass, alpine bluegrass, etc. East of the Appalachians *Poa pratensis* is sometimes called June grass in spite of the fact that *Koeleria cristata* and *Danthonia spicata* have equal claims to the June grass name

Firebush, *Kochia scoparia* The following local names have been used, Mexican firebush, fireweed, summer cypress, kochia

RAGWEEDS

Short Ragweed	*Ambrosia elatior*
Giant Ragweed	*Ambrosia trifida*
Western Ragweed	*Ambrosia psilostachya*
Southern Ragweed	*Ambrosia bidentata*
Cocklebur	*Xanthium Spp*
Rough Marsh Elder	*Iva ciliata*
Burweed Marsh Elder	*Iva xanthifolia*
False Ragweed	*Franseria acanthicarpa*
Slender False Ragweed	*Franseria tenuifolia*

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Sand Sagebrush	*Artemisia filifolia*

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Johnson Grass	*Holcus halepensis*
Sweet Vernal Grass	*Anthoxanthum odoratum*
Corn	*Zea mays*
Rye Grass	*Lolium perenne*

MISCELLANEOUS

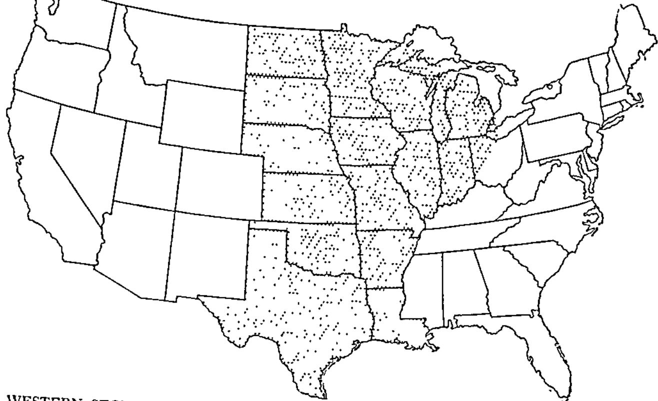
Red Sorrel (Sheep Sorrel)	*Rumex acetosella*
English Plantain	*Plantago lanceolata*
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EASTERN SECTION

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Eastern Canada

By Bram Rose, M.D.

GEOGRAPHY. Eastern Canada, consisting of the Great Lakes, St Lawrence River Valley and the Maritimes, comprises a vast area with considerable variation of climate and physical aspects The most thickly populated sections are those of the Toronto Area, the Niagara Peninsula and the region of Montreal and its environs.

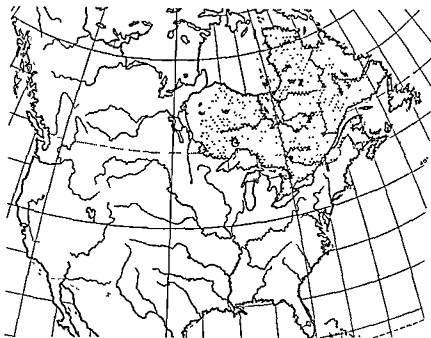
Two distinct physiographic regions are recognized. These are first, the Appalachian Acadian Area which includes the eastern section of the St Lawrence River Valley extending from the U S border down the Gulf of the St Lawrence. This highland region is an extension of the Green Mountains of Vermont and the White Mountains of New Hampshire. It consists of a series of ridges, the westernmost of which are known as the Notre Dame Mountains These extend to the tip of the Gaspe Peninsula where they reach a height of some 4,200 feet The Acadian Region includes the plain areas and low plateau of New Brunswick, Bay of Fundy, Prince Edward Island, Annapolis Valley and the highlands of Nova Scotia.

The second is the St. Lawrence Region which separates the Appalachian Region from the Canadian Shield It is a plain, beginning at Quebec City and extending some 600 miles to Lake Huron This plain has its greatest width, a distance of some 120 miles, at Montreal The regions to the north and west, popularly known as the Laurentians, are part of a vast area

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The author is indebted to Dr Elzear Campagna, Professor of Botany, Faculty of Agriculture, Laval University, Quebec, for permission to quote from his extensive survey and to reproduce Figure 1

The results shown in Figures 2 and 3 were compiled by Mrs Chamberlain and the staff of the Queen Mary Veterans' Hospital, Montreal



called the Canadian Shield. Consisting of rocky hills and gently undulating valleys, it is thickly interspersed with valleys of larger rivers and countless lakes. In actual surveys, over 40% of the surface of this area is accounted for by lakes. It is widely known for its resorts, both summer and winter.

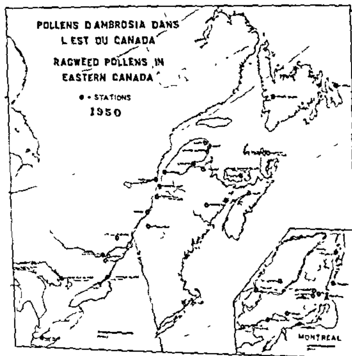


Fig 1

Climate. Although Eastern Canada is subject to extremes of heat and cold characteristic of the continental climate, these are tempered somewhat by the presence of large bodies of water such as the Great Lakes and Hudson Bay.

The Laurentian Region to the north of Montreal enjoys a temperate climate and drought is unknown. The grassy plains are subject to frosts in early and late summer but where the ground has been broken up for agriculture they do not occur and these cultivated areas receive more precipitation. The climate of the Appalachian Region presents no peculiarities since

it is governed by its proximity to the Atlantic Ocean. In this area and the St. Lawrence Lowlands deciduous trees such as the maple, beech and ash are found in abundance, especially in the river valleys.

Allergenic Factors. It is only in recent years that systematic surveys of the air-borne allergens have been attempted and these have been confined primarily to ragweed, with few exceptions. The results show an abundance of ragweed pollen in Eastern Ontario and in the Montreal District particularly,

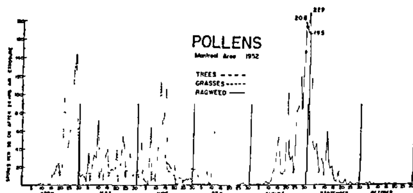


Fig 2

where the highest counts have been found. There appears to be a fairly rapid decline in ragweed pollination as one progresses down the St. Lawrence River Valley. Small quantities have been found at Quebec City and practically none from there to Gaspe or in the Maritime Provinces The lower St Lawrence and the Maritimes are regarded by hay fever sufferers as hay fever free districts. Although actual surveys have not been made, certain areas of the Laurentian District north of Montreal, as well as those of the Eastern Townships southeast of that city appear to be free of the weed This is, however, based purely on clinical observation and will require actual surveys before it can be accepted as such

A map of the various pollen stations on which the surveys for ragweed have been made is shown in Figure 1. More detailed surveys for the Montreal District, carried out by the Department of Allergy, Queen Mary Veterans' Hospital, are shown for the year 1952 in Figures 2 and 3.

The trees begin to pollinate in April and continue until mid June. Sensitivity to trees is common but the season is short and desensitization is seldom required. Of much greater clinical importance are the grasses and ragweed. The grasses make their appearance in the first week of June, and last until the end of July Grass sensitivity does not appear clinically until the middle or end of June generally, and lasts until the mid-

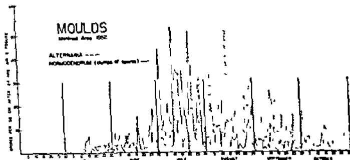


Fig 3

dle of July The greatest offender is ragweed and 1952 was a particularly severe year with counts as high as 229 spores/sq. cm

Of much less clinical importance are the molds in the Montreal area *Alternaria* and *Hormodendrum* are most prevalent and, as can be seen in Figure 3, they make their appearance in May and can still be observed on slides exposed in late October Because of the dry summers and the excessive dryness of the homes during winter, dust is also a very potent allergen in the Montreal area In general, desensitization is confined to ragweed, wormwood, grasses, dust and, to a lesser extent, *Alternaria* and *Hormodendrum*

Generally speaking, there appears to be a greater incidence of allergy due to air-borne allergens in the Provinces of Ontario and Quebec, extending up the St. Lawrence River Valley to Montreal, than in the Lower St Lawrence Valley and the Maritimes. Further pollen surveys of an all-inclusive nature are required.

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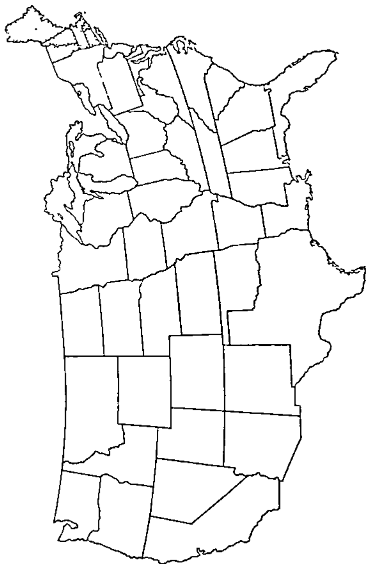
New England and Upper New York State

By J. Evarts Greene, M.D.

GEOGRAPHY. The six New England States lying in the northeast corner of the country are bounded on the north by the Canadian border, on the east and south by the Atlantic Ocean and Long Island Sound and on the west by New York State. Prominent physical features are the mountains, extensions from the Appalachian Range forming the Catskills and Adirondacks of Upper New York State, the Berkshire Hills of Western Massachusetts, the Green Mountains of Northern Vermont, the White Mountains of Northern New Hampshire, and the mountains of Central Maine. The coast of Maine is rugged, rocky and marked by many indentations. The many rivers have long been important sources of water power. Maine, New Hampshire, and Upper New York State are dotted by many lakes. The soil is generally hilly and rocky except for the level fertile valley of the Connecticut River, and the high easily cultivated plains of Northern Maine The woodlands are largely deciduous in the southern two-thirds of this region becoming increasingly mixed with coniferous forests over the northern portion

Climate. This is generally a region of abundant rainfalls. There are frequent conflicts between cold dry air masses flowing from the subpolar region to the northwest and warmer moist tropical marine air. Storms of snow and rain succeed each

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New England and Upper New York State

By J. Evarts Greene, M.D.

GEOGRAPHY. The six New England States lying in the northeast corner of the country are bounded on the north by the Canadian border, on the east and south by the Atlantic Ocean and Long Island Sound and on the west by New York State. Prominent physical features are the mountains, extensions from the Appalachian Range forming the Catskills and Adirondacks of Upper New York State, the Berkshire Hills of Western Massachusetts, the Green Mountains of Northern Vermont, the White Mountains of Northern New Hampshire, and the mountains of Central Maine. The coast of Maine is rugged, rocky and marked by many indentations. The many rivers have long been important sources of water power. Maine, New Hampshire, and Upper New York State are dotted by many lakes. The soil is generally hilly and rocky except for the level fertile valley of the Connecticut River, *and the high easily cultivated plains of Northern Maine* The woodlands are largely deciduous in the southern two-thirds of this region becoming increasingly mixed with coniferous forests over the northern portion.

Climate. This is generally a region of abundant rainfalls There are frequent conflicts between cold dry air masses flowing from the subpolar region to the northwest and warmer moist tropical marine air. Storms of snow and rain succeed each

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Northern Maine and New Hampshire, to about 22° in Portland and Bar Harbor, Maine, Southern Vermont and New Hampshire and Northwestern Massachusetts At the same season, temperatures vary from 27° to 29° along the coast from New Hampshire to New York, and from 30° to 32° on Cape Cod and the islands belonging to Massachusetts and Rhode Island The last killing frosts of spring usually occur in late April along the southern shore, in early May in Interior Massachusetts, between May 3 and 15 in Eastern Maine, a few days later in Central New Hampshire and Vermont, and about three weeks later in the northern portions of these three States. July average temperatures vary from 60° at Eastport, Maine, to 69° in Southern Maine, from 63° in Northern New Hampshire and Vermont, to 70° at Brattleboro, Vermont, and 71° at Nashua, New Hampshire, near the southern boundaries, and from 68 at coastal stations in Massachusetts, Rhode Island and Connecticut to 73° at inland cities in these three States. The average growing season varies from 100 to 125 days in the north, to 150 in the central portion, and to 175 to 200 days along the coastal areas of the three Southern States.

Social Structure. The early settlers in the New England States were chiefly English, followed by Germans, Scotch-Irish, French and Scandinavians, whereas, in New York State, the early Dutch were followed by English During the Nineteenth Century, as many industries and railroads were developed, there was a demand for laborers, which at first drew large numbers of Northern and Western Europeans and Canadians, especially Irish and Germans, and later Italians, Greeks, and Slavs New Hampshire and Vermont were largely populated by earlier settlers from Massachusetts and Connecticut Many immigrants have tended to remain in industrial centers, and there has been a gradual replacement of the earlier preponderantly rural population by urban concentrations, with the result that only Maine and Vermont continue to have a majority of rural residents Rhode Island is the most densely populated state in the United States, with close to 90% urban residents The negro population has been less than 2% in the New England States, but as high as 4% in New York. The native

other at roughly biweekly intervals with intervening fair weather periods of several days. The prevailing winds are warm and west to southwest in summer, cold and northwest in winter. Precipitation results chiefly from east and southeast winds in summer and heavy snow storms generally accompany northeast winds in winter. The rainfall is fairly evenly distributed over the 12 months throughout the six state area, lowest (less than 32 inches) in the Champlain Valley and in Northern Maine and highest (above 45 inches) in the southwestern part of Connecticut and in some of the mountainous regions Severe droughts over large sections are infrequent. Low pressure areas passing along the southern coast result in severe storms. There have been occasional storms of tropical origin in early fall, notably the hurricane of September 21, 1938, which have caused widespread damage. In summer, thunderstorms, squalls and hailstorms frequently cause local damage to crops and pleasure craft. Tornadoes of the western variety are very rare. The yearly snowfall varies from an average of 26 to 40 inches in the south to as much as four times that amount in the northernmost parts. Dense fog is common on the northeastern coast, particularly in Maine, averaging over 60 days each year at Eastport, but diminishing markedly in frequency towards Massachusetts Bay. In the interior northern sections, fogs are far less frequent and mostly limited to the mornings. The relative humidity at noon averages 72% at Eastport, Maine, with slightly higher readings in summer than at other seasons, 61% at Portland, Maine, with little seasonal fluctuation; 66% at Concord, New Hampshire; 66% at Burlington, Vermont, with 5 to 15% higher readings in fall and winter than in spring and summer, 61% at Boston, Massachusetts, with very little seasonal variation except for about a 5% increase in July and November; 62% at New Haven, Connecticut The winters become rapidly colder from the southern and easterly coastal areas to the northerly interior. The first killing frosts of fall usually occur between September 1 and 15 in the northern portion of New England, about two weeks later in the central parts, and in late October along the southern shores. The January average temperatures vary from 8° to 10° in

pegrell in 1920 He listed "Hay Fever Resorts," including the Rangely Lakes and Kineo (Moosehead Lake) in Maine the Green Mountains of Vermont, the Litchfield Hills and New London Area in Connecticut in this category, but there was scant evidence that his report could be relied upon. Duke and Durham in 1928 noted that treatment successful in eastern cities and Chicago failed in Kansas City and Oklahoma City, where pollen counts were much higher. Durham in 1930 compared ragweed pollen counts at Chicago and Boston for the 1929 season, which showed that the active season lasted 35 days in Chicago, as compared with 26 days in Boston. The average daily pollen count was 118 in Chicago, as compared with 22 in Boston, and the total pollen count for the season was 4,132 for Chicago, as against 582 for Boston. He concluded that Boston has the shortest and lightest ragweed season of any large city east of the Rocky Mountains. In 1935, Durham summarized findings in Boston and other cities for the five-year period 1929 through 1933, which showed an average season's total ragweed pollen count in Boston of 790, as compared with 5,093 for Chicago. Pollen counts in July, August and September for 1932 and 1933, in Boston, were found to average 746 for ragweed which constituted 95% of the total counts for those months, the remainder being distributed as follows: Chenopod-Amaranth 16, Grass 13, Composite 1, Miscellaneous 7 Again in 1935, Durham mentioned the annual exodus of ragweed sensitive patients in New England to the White Mountains of New Hampshire for the preceding 80 years and the favorable report of Wyman on Upper Maine in 1872, and listed the following results of ragweed pollen counts

	Days with count above 25	*Maximum daily count*	*Season's total*
1934 Bethlehem, N H	2	48	211
1934 Upper Dam (Rangely Lake), Me	1	28	114
1934 Bar Harbor, Me	5	76	455
1929-1933 Boston, Mass	10	140	790
1934 Nantucket, Mass.	11	309	1100
1934 Block Island, R I	15	200	1323

born population is as high as 95% in Vermont, 86% in New Hampshire, and 60% in Massachusetts, but lower in Rhode Island and Connecticut, where the concentration of manufacturing centers has attracted many immigrants from all parts of Europe.

The Adirondack Mountains of New York, the Green Mountains of Vermont, the White Mountains of New Hampshire, and the Berkshire Hills of Massachusetts are well known as both summer and winter resorts, and the sandy beaches of the New England Coastal States, including Cape Cod and the neighboring Islands of Nantucket and Martha's Vineyard are also summer resort areas.

Housing must be substantial and include adequate heating for year-round living, because of the relatively cold winters. Fumes from oil-heaters and stoves occasionally prove irritating to asthmatic patients, and house dust is particularly troublesome in fall and winter months when windows are closed and furnaces turned on Low rental housing is scarce, particularly in proximity to Air Force bases. The New England States are adequately supplied with churches and physicians in most areas. The schools are generally very good, and many of the leading institutions of higher learning are located here.

Allergenic Factors special to this region include house dust, causing inhalant allergies in the fall and winter months, plant oils, such as those of poison ivy and sumac, and the various dyes encountered in the shoe and textile industries, causing contact dermatitis. Upper respiratory infections, chronic sinus and bronchial infections are especially prevalent along the New England coast The Cape Cod area has been found to be unusually abundant in airborne molds The dermatitis among celery growers and the inhalant allergies in some tomato growers when exposed to the plant pathogen, *Cladosporium fulvum*, have been reported by Rackemann and his co-workers. Finally, the increase in severity of respiratory allergies frequently noted on exposure of patients to damp weather is often seen along the New England Coast and in the larger river valleys.

The Pollen Incidence of New England has been described repeatedly in the past, beginning with the survey of Schep-

ivy by means of sprays is being conducted there with results which thus far appear to be encouraging.

LOCAL STUDIES*

Maine. Sylvester and Durham reported a ragweed survey in 1938, 1939 and 1941. It was observed that the seashore and forested White Mountains isolated the state except for the southwest border. There was little evidence of pollen being carried into Maine across the Canadian border. Giant ragweed was seen at Portland. Aroostook County was found to be almost free of ragweed.

Massachusetts. Rackemann and Smith in 1931 described the hay fever plants of Eastern Massachusetts by means of field studies and pollen counts. They outlined the three seasons of trees, grasses, and ragweed. The tree season, beginning in early April, included the pollination seasons of alder, poplar, elm, ash, birch, and oak, each lasting 15 to 20 days Only the birch and oak seasons extended into May, except for willow, which was said to be largely insect pollinated The oak season was found to be completed about June 1 The grass season, beginning about the middle of May, included the pollination seasons of sweet vernal grass, English plantain, and meadow foxtail, June grass, Canada blue grass, redtop, orchard grass, couch grass, and timothy. Red fescue, meadow fescue, sheep sorrel, and wild oat grass were found at this season, but were of minor importance. The grass season gradually declined during late June, July and August. During this period appeared lamb's *quarters (Chenopodium album)*, giant ragweed, crab-

* Since this volume went to press, the first complete State-wide and State-sponsored survey of airborne pollen and molds has been published. The survey of the atmospheric allergens of the State of Maine has been conducted under the auspices of the Department of Botany and Entomology of the University of Maine The monograph is the result of the joint effort of many individuals and organizations Its title: *Maine—Airborne Pollen and Fungous Spore Survey*, by Fay Hyland, B F. Graham, Jr, F H Steinmetz, and Marilyn A Vickers of The University of Maine, Orono, Maine, 1953

In 1937, Durham added the following figures for ragweed counts made in 1935:

	Av number of days with count above 25	*Maximum atmospheric contamination*	*Average seasonal total*	*Ragweed pollen index*
Bar Harbor, Me	5	76	426	8
Eastport, Me.	4	43	280	6
Upper Dam (Rangely Lakes), Me	1	69	139	2
Boston, Mass.	10	140	790	15
Nantucket, Mass	12	309	952	20
Bethlehem, N. H	3	48	262	5
Block Island, R I.	20	336	1490	31

A ragweed index of 10 or more was considered not suitable for relief; 1 to 5, good to fair, less than 1, excellent. In 1948, in a study of Acadia National Park (Bar Harbor, Maine), Durham found five days with ragweed count above 25, a maximum atmospheric contamination of 76, an average seasonal total of 426, and a ragweed pollen index of 8 In 1953, Durham reported generally low ragweed indices (below 5) in Central and Northern New Hampshire and Maine, but none below 1, whereas, in Upper New York State, he found only a few indices below 5 Locations with perfect or extremely low ragweed counts were Houlton, Newagen, New Portland, Presque Isle, and St Francis, Maine, Colebrook, Errol, Lancaster, and Moosilaukee, New Hampshire, and Blue Mountain Lake and Keene Valley, New York. He stated that one must go to the mountainous regions adjacent to Northern New Hampshire and Maine to find a satisfactory degree of relief He found no other significantly low ragweed areas in New England. The grasses and trees (birch and miscellaneous trees) were found to be about the same in Northern Maine as in Southern New Hampshire, but oak and elm were additional trees of importance in Massachusetts, Rhode Island and Connecticut On Nantucket Island, the ragweed pollen counts have been high, but a campaign to destroy ragweed and poison

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grass, barnyard grass, common mugwort *(Artemesia vulgaris)*, marsh grasses, and pigweed *(Amaranthus retroflexus)*. These plants were also found to be of minor importance, either scarce or poor pollen producers. The ragweed season began in mid August and continued until late September. During this period the pollen of short ragweed *(Ambrosia elatior)* was the only one found on pollen plates in significant amounts, although beard grass, marsh elder, cocklebur, and goldenrod

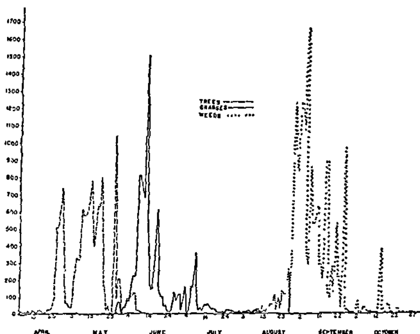


Figure 1. Average Pollen Counts in Newton, Mass., a Suburb of Boston, for 1941

were in bloom at the same time. Walker in 1936 listed willow, maple, oak, birch and poplar as the important pollens of spring season (March, April and May), June grass from mid May to mid June, and all other grasses from mid June to mid July, as the pollens of the early summer season, and the ragweeds (short north of Connecticut, and giant and short south of Connecticut) as the pollen of the fall season for the east coast states. Pratt in 1938 defined the tree season as early April

to mid May (short and relatively unimportant), the grass season as late May to late July, and the ragweed season as August 15 to the first heavy frost. He listed the chief New England grasses as orchard grass, timothy, June grass, redtop, and sweet vernal grass. Pratt and co-workers made a pollen survey in 1940, with stations in Boston, Newton, and Worcester, Massachusetts, and Providence, Rhode Island. Figure 1 is repre-

TABLE I

(From Report by Dr Francis H Chafee to the Pollen Survey Committee of *The American Academy of Allergy* for 1952)

PROVIDENCE, RHODE ISLAND

	Apr	*May*	*June*	*July*	*Aug.*	*Sept*	*Total*
Elm	161						161
Alder	43						43
Maple	160						160
Poplar	219						219
Birch	85	240					325
Willow	30						30
Ash	2	21					23
Oak	2	1264	22				1288
Sycamore		21					21
Grass	6	76	380	122	4	4	592
Plantain		44	32				76
Ragweed					403	1130	1533
Cocklebur					*16*	51	67

sentative of the findings. Of the tree pollens, elm, birch and oak were by far the most abundant, with poplar and maple appearing in moderate amounts, and a little alder, ash and beech. The pollens of the different grasses could not be distinguished from one another. The weed pollens found were ragweed (92%), goldenrod (4%), cocklebur (3.2%) and wormwood (0.8%).

Connecticut. Jennes studied the airborne pollens at Waterbury, in 1944, 1945 and 1946 and reported his findings in 1947 and 1948. He found both short and giant ragweed, the former being much more abundant. Ragweed appeared on his slides between August 15 and 20, and disappeared between September 14 and 20. The total season's counts varied from 273 to

393. He listed the significant plant pollens in order of importance as ragweeds (87%), grasses (56%), trees (11%), and plantain (4%). Of lesser and questionable significance were Artemesia, Chenopods, and Amaranths. The trees included hazel and alder in early april; maple, elm and poplar in April, birch in late April; beech and ash in early May; and oak in May. Birch and oak were the most important. Plantain pollinated from mid May to mid July, grasses (June grass, timothy, sweet vernal, redtop and bermuda grass) from late May

TABLE II

(From Report by Dr. Francis H. Chafee to the Mold Survey Committee of *The American Academy of Allergy* for 1949.)
Daily Exposure of Slides at Providence, Rhode Island

	May	*June*	*July*	*Aug*	*Sept*	*Oct*	*Total*
Alternaria Spore Counts		34	106	110	58	56	364

to mid July, and ragweed from August 2 to 12 to September 20

Rhode Island. Fishbein in 1929 defined the three hay fever seasons as mid March to May (black walnut, cottonwood, oak), mid May to mid July (grasses—June, orchard, timothy, redtop), and early August to mid September (ragweed). Other pollens listed were sheep sorrel (May to July), yellowdock (May-July), lamb's quarters (June-September), cocklebur (July-September), giant ragweed (August-October), and also elm, poplar, birch, maple and willow (Tables I and II).

Summarized ragweed records of The Pollen Survey Committee of The American Academy of Allergy for each of the New England States and New York will be found in the Appendix.

Molds. In 1937, Durham reported *Alternaria* spore slide counts for Boston during the summer of 1933 The average daily slide count varied from three to six during August and September, and was shown to be much less than that of any of the areas studied in the mid-west. He stated that the *Alternaria* season does not begin before May and, in most

places, not until July In 1938, the same author published *Alternaria* and *Hormodendrum* spore slide counts from eight New England stations as follows:

Average seasonal totals of	*Alternaria*	*Hormodendrum*
Augusta, Maine	160	38
Boston, Massachusetts	486	1246
Poland Spring, Maine	750	1080
Portland, Maine	710	722
Presque Isle, Maine	306	1122
Sherman, Connecticut	400	90
Southport, Maine	404	858
York, Maine	202	570

In 1938, Pratt reported a mold plate survey in Boston, which showed molds present in the air throughout the year. *Alternaria, Hormodendrum, Aspergillus, Penicillium,* and *Chaetomium* were most commonly found, with *Alternaria* and *Hor-*

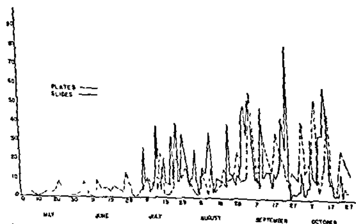


Figure 2 Average Alternaria Counts at Two Boston Stations, Newton and Worcester, Mass for 1941

modendrum gradually increasing during the spring, reaching a peak in July and August, and declining during the fall. In another plate and slide mold survey in 1940, Pratt and co-

workers showed that the *Alternaria* season overlapped the grass and weed seasons (Fig. 2). In 1940-1941, Dimond and Thompson carried out a plate mold survey in New Haven, Connecticut. They found 26 genera with *Alternaria* and *Hormodendrum* the most common. Nearly as common were *Dematium*, common yeasts, *Aspergillus*, *Penicillium* and *Sepedonium*. *Alternaria* and *Hormodendrum* appeared in April, reached a maximum in late August, and decreased to negligible in winter. *Dematium* and yeasts predominated in winter with *Aspergillus* and *Penicillium* the same all year round. In 1948, Jennes (Waterbury, Connecticut) stated that molds at times caused summer hay fever and listed *Alternaria*, *Hormodendrum* and *Aspergillus* as most important in that respect. A mold plate survey was carried out in Boston in 1949, by Kaplan, who found *Alternaria*, *Hormodendrum* and *Penicillium* predominant with *Aspergillus*, *Coccosporium* and members of the *Order Sphaeropsidales* frequently found throughout the year. Peak incidence of total fungus spores occurred during June and from September to November.

3

New York City and Eastern New York State

By Eugene H. Walzer, M.D.

GEOGRAPHY. New York State has been described as a box-toed shoe, with Long Island trailing out into the Atlantic Ocean like a loose spur. The back or eastern half of the shoe is the area in which we are interested.

The most notable topographic features of the section to be described are (1) the Adirondack Mountains, a roughly circular range rising to 5000 feet, in the northeastern part of the State, (2) the Hudson River, rising in the Adirondacks and flowing south for a distance of 312 miles, (3) the Allegheny Plateau, which extends from the Hudson River westward across the southern part of the State, (4) the Catskill Mountains, low highlands which form the eastern end of the plateau, (5) the Mohawk River, which flows easterly across the central part of the State to empty into the Hudson about 150 miles north of its mouth, and (6) Long Island, a low, sandy coast 116 miles long and 15 to 20 miles wide The mainland approach at the western end of Long Island is traversed by the lower end of the Hudson River and other channels that form a branching bay with several islands, the largest of which are Manhattan Island and Staten Island This branching bay has made one of the best harbors in the world, and on its waterfront has arisen the largest city in the United States, New York City.

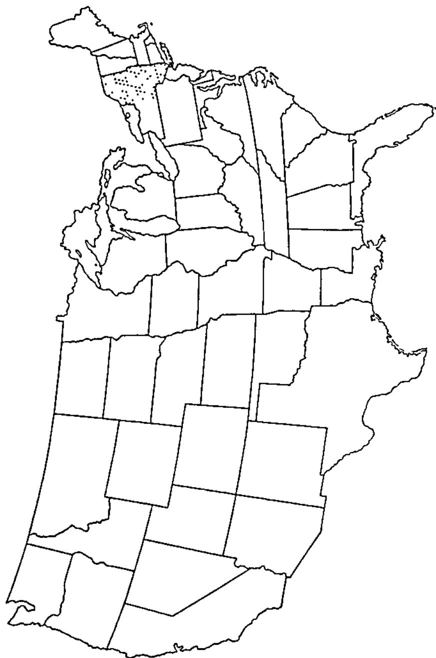
The continental glacier, which covered the greater part of New York State, affected its whole topography: rounding hills, broadening and deepening many valleys, changing the drainage, and dotting the state with innumerable lakes

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The Climate of New York State is one of extremes: hot in summer and cold in winter. In general it may be said that the Atlantic Ocean tempers the rigors of winter and the heat of summer in New York City. The average mean temperature for the years varies between 40° F. in the Adirondacks to 50° in New York City. The maximal temperature attained in the summer is about 94°. In New York City, the mean summer temperature lies between 70° and 75°, and temperatures rarely exceed 90°. In winter, the inland and mountain temperatures drop to zero or lower during exceptional cold spells, while in New York City it rarely drops below 5°. Frost usually starts by mid September and ends by mid April.

The average precipitation for this area varies between 40 and 55 inches, with the larger figure recorded in New York City. In Upper New York State and the Adirondacks, snowfalls are heavy, and may attain a depth of three to four feet, whereas in New York City they rarely exceed one foot in depth. High relative humidity is an important meteorologic factor, especially in New York City, where it rarely falls below 60%. In July and August, when temperatures are at their highest, the relatively high humidity produces much physical discomfort. Nightfall generally brings relief upstate, but in New York City the humidity may cause insomnia in summer.

In an area as industrially important as Eastern New York State and New York City, dust, smoke, soot and chemical vapors are bound to contaminate the air. In New York City alone it has been estimated that 200,000 tons of soot and smoke per year are poured down on the city, and an equal quantity is blown away to settle within a 50-mile radius. By the same token, smog from neighboring industrial centers is blown in on New York. Not only is this smog produced by industry, but also by the hundreds of thousands of heating units in apartment houses, private homes, business places and utilities of the cities. Thousands of incinerators disperse their volatile garbage into the air daily. Moreover, fumes of carbon monoxide from the thousands of cars, buses and trucks join with ammonia, fluorine, chlorine, sulphur dioxide and formaldehyde



Despite the vastness of this transportation network, overcrowding of all facilities is the rule.

Mention of New York State calls up visions of large cities and the smokestacks of industry, because New York is one of the nation's industrial centers. Yet within this area, income for many hundreds of thousands of people is provided by agriculture, specifically dairy farming, poultry raising, truck farming and fruit growing. However, manufacturing is the most important occupation The principal industry of the State is the manufacture of clothing and accessories, and is largely concentrated in New York City. Other industries include printing and publishing, the production of textiles, food, electrical equipment, chemicals, dyes, abrasives, cameras, photographic supplies, thermometers and optical equipment

Allergenic Factors. There are no allergenic factors peculiar to this area which do not apply to the rest of the Northeastern Coastal Section of the United States. The nature of the climate drives people indoors during the fall and winter months. Hence indoor allergens play an important role during these seasons Central heating with its drying effect on the respiratory mucous membranes, overcrowding of schools and homes, smog, and the changeable nature of the climate are important factors predisposing to respiratory infections both acute and chronic. These together with house dust are responsible for most of the complaints in the cold season. Infection is important both as an etiologic agent and as a complicating factor in winter asthma and vasomotor rhinitis. Sinus infections are very common in this part of the country Because of the lack of exercise space in urban areas, house pets must be kept indoors most of the time. Hence, animal dander has become important as an allergenic factor. Spring, summer and early fall inhalant problems are primarily caused by pollen and molds

Food allergy occurs in the same proportion here as elsewhere However, because of the polyglot character of the population and the fondness for foreign dishes in certain quarters, sensitivity to bizarre foods is not uncommon.

Pollen Incidence. The three pollen seasons of early spring,

to contaminate the atmosphere. Although efforts are being made to curb this smog, to date little has been accomplished.

Social Structure. The polyglot character of the population of New York State is one of the outstanding characteristics of this area. During the past century and one-half, the majority of successive waves of immigrants from Europe passed through the Port of New York. Many of these people settled in New York City, or were absorbed by industry and agriculture in the inland areas. All of these have brought with them national or racial heritages which have contributed to the culture, diet and customs. With restriction of immigration over the past 25 years, there has been a tendency for this potpourri of peoples to boil down to an even consistency, and for a considerable breakdown in racial and national differences.

Churches of all creeds are numerous. Schools, while terribly overcrowded in the cities, are good, and progressive throughout the State. Opportunities for advanced education are almost limitless, but competition is keen There is certainly no shortage of physicians or hospitals throughout the area. Low rental housing is scarce despite a tremendous postwar construction boom. Of recent years there has been a tendency for the population to move their homes from the overcrowded urban centers to less congested suburban communities, while the heads of the families continue to work in the cities.

Air-conditioning is found in many of the plants and office buildings, and increasingly in homes and small places of business. Central heating is almost universal Furnaces are heated by coal, gas or oil, and heat is transmitted by steam or circulating hot water in radiators, or by hot air through ducts All of these have a marked drying effect on the respiratory mucous membranes. Patients with respiratory allergy are prone to complain about "stuffy noses" and "dry throats" in the winter.

Transportation facilities in this area are among the best in the country. Vast networks of railroads, bridges, public highways and waterways cover the region, with airports situated near the larger centers. Much of the traffic and freight moving over these ways is directed to and from the port of New York.

weed is of two species, tall, *Ambrosia elatior*, which begins to shed pollen about the second week of August, and short, *Ambrosia trifida*, which begins a week or two later. The highest concentration of pollen of these weeds is usually found early in September, after which the counts diminish. The average season lasts six to eight weeks, and usually ends by September 25. There is a wide variation in the ragweed contamination of the air in different parts of this region. Lowest counts are found in some of the more heavily wooded areas of the Adirondack Mountains, where many hay-fever sufferers find refuge in late summer. Highest counts for the State have been reported from Albany and Buffalo, where the pollen concentration may be two to three times that of New York City. A six-year study of pollen concentration in New York City revealed that counts were highest in the Boroughs of Richmond and Queens, lowest in Brooklyn and Manhattan. Pollen concentration in cities and towns within a 50-mile radius of the metropolis usually are roughly equal to the average for New York as a whole Locally in Manhattan there is little ragweed Most of the pollen occurring in this Borough in August and September is blown in from ragweed areas in New Jersey, south and west of the City There is no pollen-free area in the neighborhood of New York City Fire Island, which lies off the southern coast of Long Island and was regarded as a refuge for many years, was found to have relatively high counts on days in which there were pollen spills in the city proper Studies on Ambrose Lightship, a weather observation point anchored nine miles off the coast in a ragweed-free environment, showed pollen counts comparable to those in the city on days when the pollen concentration within the city was high and the wind was blowing from the west or southwest Within the past several years, a ragweed extermination campaign in New York City has been actively carried out by the Health Department. This has been of questionable value, since most of the pollen comes from outside the city limits

The pollen of cocklebur, goldenrod, marsh elder, pigweed,

early summer and later summer succeed each other in New York State regularly every year. The early spring season begins with the pollination of native *trees*, which produce the highest pollen concentration. It must be stressed that, despite high tree pollen counts, the numbers of patients with tree pollen sensitivity are few in number. The earliest pollinators are elms, maples and willows, which begin in early April and finish before May. Counts for these trees are usually not high, and are not as important clinically as the more plentiful and prolific poplars and birches, which shed their pollen in late April and for the first two or three weeks of May By far the greatest producer of pollen is the oak, which is found in abundance and in many species. These trees shower the area with pollen for two or three weeks of May, causing most of the symptoms of the early spring season Ashes and beeches spill their pollen concurrently with oak, but are of lesser importance. Hickory, which pollinates a little later, is a minor offender

During the early summer season, *grass* pollen concentrations are not as high as those produced by trees, but affect more people with frequently more severe symptoms. The grasses pollinating in this season are sweet vernal grass, which begins about mid May and runs for several weeks, to be followed by June grass, which tapers off about the middle of that month. During the last week in June and the first week or two of July, timothy and redtop come into flower and make their major contributions to the pollen counts. Several minor offenders, including the fescues, red and meadow, and Canada blue grass, release traces of pollen during late June and early July Although early July marks the end of the early summer season, traces of grass pollen have been found in the air as late as September. These have no clinical importance A minor but definite cause of trouble during this season is the pollen of the weed English plantain, which may be found in the air from May 15 to as late as July or August.

Late summer ushers in the all-important *ragweed* season The pollen of ragweed is the prime offender in this area Rag-

4

Buffalo and Western New York State

By CARL E. ARBESMAN, M.D.

THE AREA within a 50 mile radius of Metropolitan Buffalo is frequently referred to as the Niagara Frontier. It is hoped that the descriptions briefly given will acquaint you with the allergic problems peculiar to this section, as well as the usual offenders found in the Northeastern States.

Geography. The City of Buffalo is located at the most eastern end of Lake Erie and the mouth and southern part of the Niagara River. The elevation of Buffalo ranges from 578 to 685 feet above sea level. The famous Niagara Falls, a city of over 100,000 population, is located just 20 miles north of Buffalo

In this Western New York Area are many large and small towns and villages The surrounding countryside is relatively flat, fertile land In Niagara County, around the City of Lockport, tremendous orchards of various fruits such as apples, pears, peaches, and cherries are grown This section is probably the largest fruit growing belt in New York State, and one of the largest in the country To the west of Buffalo, in the vicinities of the Cities of Dunkirk and Westfield, tremendous grape vineyards are the chief products grown In this latter City, is the home of the Welch Grape Company.

The usual truck farms, cultivating the grains, vegetables and hay, as well as several dairy farms are scattered throughout this entire low rolling land, through which are found many creeks, occasional hills, and considerable wooded lands, particularly 20 to 30 miles south and west of Buffalo in the Boston Hill Area

lamb's quarters and marsh grass have been found locally in small quantities. Few of these are of clinical importance.

Molds. Particularly *Alternaria* and *Hormodendrum*, are found in this damp climate. Although both *Alternaria* and *Hormodendrum* spores may be found from April through October, studies in New York City indicate that *Hormodendrum* spores are present in the air in greater concentrations in June and July, and *Alternaria* in August, September and October. Occasionally, *Alternaria* has been found as late as November or December, in Rockaway Park, Long Island. Positive reactions for *Alternaria* and *Hormodendrum* have been found in skin testing. It is generally believed that *Alternaria* reactions are of clinical importance, but the significance of *Hormodendrum* reactions is still questionable. Pure mold-sensitive patients with asthma and vasomotor rhinitis are not nearly as common as pollen cases. More often *Alternaria* sensitivity is combined with pollinosis, particularly ragweed.

Climate. The climate of the Niagara Frontier is most desirable, particularly in the summer months. The average temperature for the months of June, July, and August is from 65° to 74°. There are rarely more than three or four days during the entire summer with temperatures over 90°. During an average winter there are only four days with a temperature of zero or below. There is a definite lack of hot humid weather that one experiences along the Atlantic Seaboard in cities like New York, Philadelphia, or Baltimore.

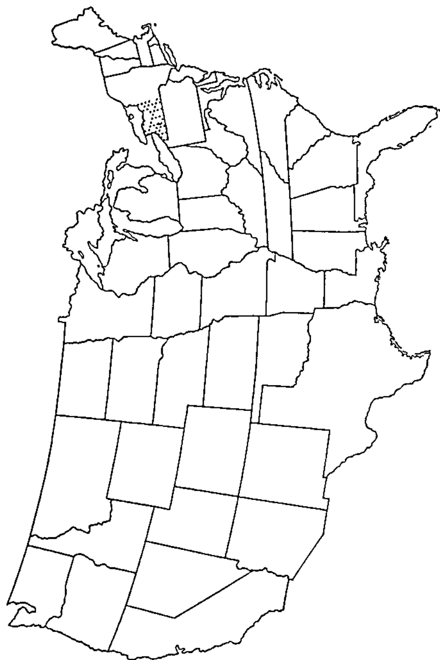
Industries. The industries in the Buffalo Area are most diversified The key industries are steel and rolling mills, iron, and steel products, motor vehicle parts, machinery, printing, clothing, plastics, furniture, drugs, and aircraft In addition to this, Buffalo is the first City in the world in flour and feed milling Tremendous amounts of other grains are processed annually in this city. People living in the vicinity of these huge grain elevators are apt to have sensitivities to the various dusts and smuts from these sites

Niagara Falls, is probably the largest chemical manufacturing center in the world Considerable irritating gases and odors are often encountered in certain sections of the City of Niagara Falls These fumes frequently aggravate the symptoms of a Niagara Falls resident

Population and Social Structure. The total population in the Buffalo-Niagara Falls Metropolitan Area according to the 1950 Census is 1,081,695 Buffalo has very adequate public and private schools Four colleges, including the University of Buffalo, contribute to the higher education. Churches of all denominations are plentiful Medical services, such as hospitals, nursing homes, orphanages, nurses, technicians, and physicians are readily obtainable

Its people are comprised, principally, of native born Americans, and Buffalo is second among the 15 cities in percentage of native population

Forty-six per cent of the native whites are of American-born parentage Of the 517 foreign born and native Americans of foreign or mixed parentage, the largest group (137) are from



Niagara River. In the hot summer months, these flies are in such abundance, they look like clouds of smoke around electric lights The Caddis fly has a life cycle of 24 hours. Either the dust from the wings of the live flies, or from the disintegrating of the dusts from the dead flies, cause a great deal of difficulty to those patients allergic to them. Fortunately, this is strictly a local problem, confined to people living within six to eight blocks of the waterfront. This, therefore, affects a large group of Italian people, as this locality on the American side is com-

TABLE II

COUNT OF ALTERNARIA SPORES FOR BUFFALO, NEW YORK 1953

Number of spores per sq cm of surface in 24 hours.

	Mar	*Apr*	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct*	*Nov.*	*Total*
Alternaria	0	0	3	52	288	223	94	41	57	758

prised chiefly of Italians However, on the Canadian Shore, and in the City of Fort Erie, Ontario, are many beautiful summer homes and beaches and, hence, people of all nationalities in these areas could be so affected.

The problem of cereal dust sensitivity is, likewise, a local one People in the nearby vicinity of the huge grain elevators in the older section of Buffalo, chiefly, a poor Irish section, can be troubled by these factors. However, people living in all sections of the area, but working as grain handlers could, likewise, be afflicted.

The allergens of contact dermatitis from the many large plastic factories, machinery tool, and chemical companies are very prevalent

Pollen Incidence (Table I). The pollen incidence in the Buffalo Area is very similar to that of other cities in the Middle Atlantic States. However, Buffalo is known as "the metropolis in a forest of trees," as there are *more than 400,000* city-owned trees on the city's 42 square miles, hence the tree pollen factor is more important than in most cities The chief offenders in

Poland, followed by 12% from English speaking countries and 9% from both Italy and Germany. Three and two tenths per cent of the population are non-white, chiefly negro.

According to the 1950 Census, the major occupational groups in the Buffalo Metropolitan Area, 40% were classified as craftsmen, foremen, and kindred workers, as well as operators. Nine

TABLE I

POLLEN RECORD FOR BUFFALO, NEW YORK 1953

by Wilbert H. Spencer, M.D.

Pollen grains per cu. yd of air.

	Mar.	*Apr.*	*May*	*June*	*July*	*Aug*	*Sept.*	*Oct*	*Total*
Maple Spp	10	22	64						96
Elm	499	1179							1678
Alder	4								4
Poplar		123	296						419
Birch			287						287
Oak			114	5					119
Walnut & Hickory				10					10
Grass			2	248	178	4			432
Plantain				9	9	22			40
Chenopod-Amaranth						24	2		26
Ragweed						2819	1544	14	4377

per cent were laborers. Professional, technical, and kindred workers were 10%. Managers, officials, and proprietors comprised 14% of the population. The average family's effective buying income in 1949 was $4,992, as compared with the overall United States figure of $4,474. However, like in all large metropolitan areas, with expansion of industries, there is quite a housing shortage, despite the fact that houses are being built in increasing percentages all the time. Most of the newer type homes are heated by the open hot air furnace method, fired either by coal, oil, or gas These open air systems often cause trouble to patients sensitive to dust and fungi.

Allergens Peculiar to This Region. Allergens peculiar to this region are few. However, sensitivity to the Caddis fly (sandfly) and May fly is quite important. These insects breed in the slow current waters along the shores of Lake Erie and the

and carrying on for about 10 days. In early April we are confronted with the poplar *(aspen)*, and the American and English elms. In latter April and early May the box elder, sugar maple, and poplar *(cottonwood)* are prevalent Toward the middle or end of May we are exposed to the various oaks and the walnut and hickory tree pollens

Our *grass* pollens are chiefly orchard grass *(Dactylis glomerata L.)*, June grass *(Poa pratensis L.)*, redtop *(Agrostis alba L.)*, and timothy *(Phleum pratensis)* They are found in many

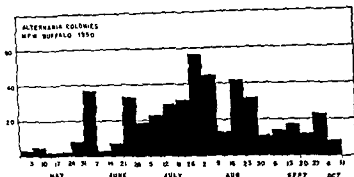


Fig 2

empty lots, lawns, and fields June grass may begin to pollinate in late May or early June and reaches its peak in *mid June.* Orchard grass starts in early June and is at its highest in late June or early July Timothy follows very close behind and many continue until the end of July The entire grass pollinating season is usually from six to eight weeks.

Of the *weeds* most prevalent in this region are the giant and short ragweed *(Ambrosia trifida and A artemisifolia L.)*. Pollination is observed the first few days of August, but significant amounts are not on the slides until about August 12 to 15. The peak of the ragweed season has been *the last few* days of August and the first week of September. By September 20 the pollen counts drop very significantly and very little is seen on the pollen slide after September 25 despite the fact that there has been no frost and the patients still have some difficulty Other weeds present but of slight significance in this

this group are the American and English elms *(Ulmus americana L. and U. campestris L.),* the silver and sugar maples *(Acer saccharimum L. and A. saccharum Marsh),* poplar *(cottonwood),* the box elder *(Acer negundo L.)* and the red oak *(Quercus rubra L.).*

The pollinating seasons for each of these trees is relatively

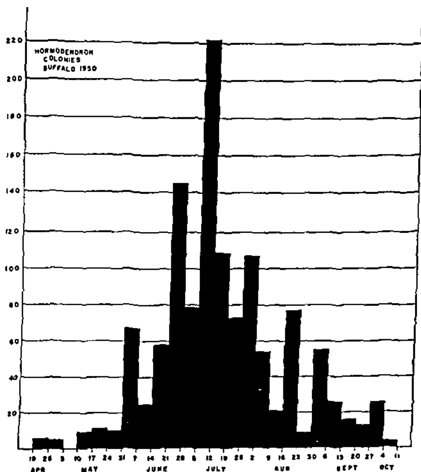


Fig. 1

short, one to two weeks. However, when patients are allergic to more than one tree pollen, the season may last as long as six to eight weeks. Naturally, the time of pollination varies considerably with the weather. Usually the first pollens to appear are the silver maples about the last week in March

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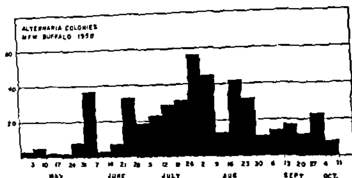


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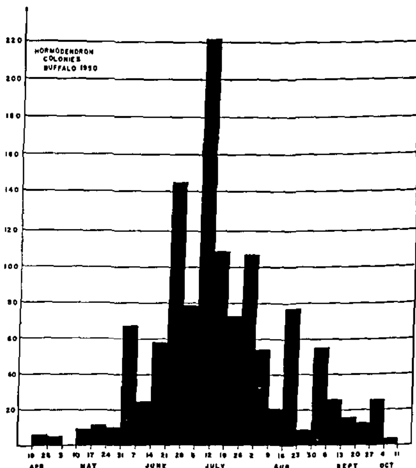


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5

Eastern Pennsylvania, New Jersey and Delaware

By Louis Tuft, M.D., and George I. Blumstein, M.D.

GEOGRAPHY. Philadelphia lies in the center of the area to be described. It is just south of the fortieth parallel, and is therefore almost directly east of Columbus, Indianapolis and Denver. The city itself is 5' above sea level while the surrounding areas vary from sea level to 500' above with the exception of the mountainous areas of Northern Pennsylvania where altitudes may be as much as 2000' above sea level. To the east lies the rich, flat, fertile soil that has made New Jersey one of the largest producers of vegetables in the United States. Along the ragged coastline of New Jersey, fringed with inlets and bays, are to be found the finest beaches in the world. To the north lies the fertile Lehigh, Cumberland and Lebanon Valleys with the anthracite coal district at its northernmost point. To the west we find the main agricultural section of Pennsylvania with its rolling plains, rough upland, low hills and fertile valleys that includes the Lancaster Plains and Chester Valley. To the south lies the flat and fertile State of Delaware.

Climate. Since Philadelphia is the hub of this territory and the meteorological conditions are typical of the entire area, all the data presented will pertain to it. Deviations depend upon local factors but generally speaking the variations are minor and insignificant insofar as they contribute to or aggravate existing allergic states. The average annual precipitation in this area is 40.4 inches. The average amount of snowfall is 22.4 inches. The mean summer (April to October) temperature is 69.8 while the mean winter (November to April) tempera-

area are the burweed marsh elder and cocklebur. English plantain, pollinating in early summer, lamb's quarters and pigweed in mid and late summer are rare clinical offenders.

Fungi. Fungi are quite prevalent in the Buffalo Area. In a recent survey of mold and spore counts in the Niagara Frontier 22 species of fungus types were identified. Those found in greatest abundance were (1) *Hormodendrum,* (2) *Alternaria,* (3) *Penicillium,* (4) *Aspergillus,* (5) *Phoma* and related spores, and (6) *Helminthosporium.*

Hormodendrum (Graph I). *Hormodendrum* is seen in significant numbers by mid April and continues until mid October. The highest concentration is usually the end of the first week to the beginning of the second week of July. Another rise is seen in mid August.

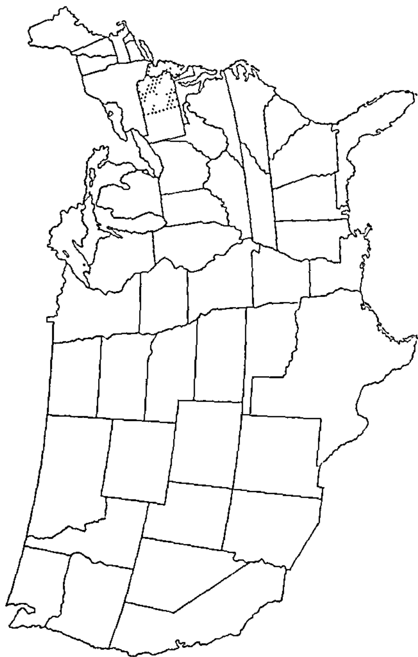
Alternaria (Table II). *Alternaria* occurs in the air from the first of May and is present until the middle of October. The highest peaks for *Alternaria* spores occur the first two weeks in June, the end of July, first of August, and again the last week in September or early October (Graph II).

The other fungi are not so prevalent, but colonies of various molds are seen on plates every month of the year. The lowest counts are found in December, January, and February.

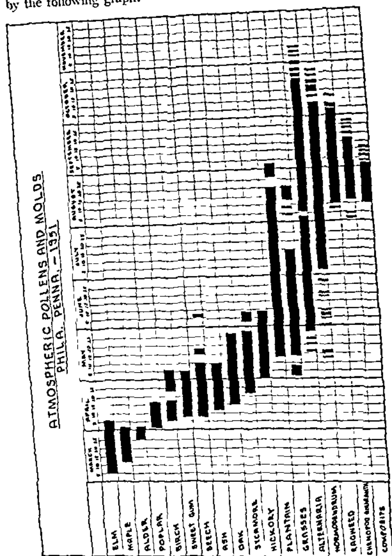
ture is 41.2°. The following table gives the mean temperature and precipitation by months.

Month	Mean Temperature ° F.	Precipitation in Inches
January	32.8	3.30
February	33.9	3.32
March	40.8	3.39
April	52.1	3.05
May	62.9	3.20
June	71.4	3.24
July	76.2	4.15
August	74.8	4.62
September	68.0	3.14
October	57.8	2.81
November	45.7	2.70
December	36.3	3.43

From the meteorological standpoint, there are two season which seem to influence allergic diseases. The spring season, which starts in early March and continues for about four to six weeks, is the milder of the two. The other is the fall season, which starts in mid or late September and often continues into December. Once the weather becomes equalized, whether as a warm spring or the cold winter, then the period of aggravation rapidly diminishes in intensity and subsequently disappears. There is no constant meteorological state that is common to these periods since they bear no direct relationship to temperature, humidity, amount of sunshine or direction and velocity of the wind. During these seasons, however, this area experiences several types of weather in the same day. The mornings and evenings are pleasantly comfortable to cool while the afternoons are almost summer-like. The aggravated allergic state is actually due to the inability of the patients to properly acclimatize themselves to the rather rapid meteorological changes rather than to the weather conditions per se. There is, however, one meteorological state that invariably accentuates the allergic state and that is dampness. Not all allergic states or patients are adversely affected in this manner but the percentage is sufficiently large in the respiratory groups of allergic



Atmospheric pollination and sporulation are best illustrated by the following graph:



Aerobiological Survey conducted by
Jay Spiegelman, M D and C I. Blumstein, M D.
(Allergy Clinic—Mt. Sinai Hospital, Philadelphia, Pa.)

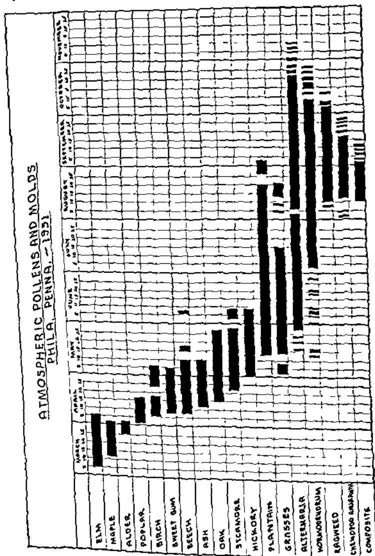
diseases to warrant the consideration of dampness as a non-specific aggravating factor. Patients of this type often are adversely affected by visits to seashores or other summer resorts where dampness is likely to prevail. They frequently are able to predict weather changes by symptoms provoked by alterations in their allergic state.

Allergen Factors. The atmospheric pollution due to industry in this area is of such magnitude that space does not permit a complete review of it here Only those phases that have a bearing on allergic states will be discussed. The Marcus Hook Area is an important oil refining center and the surrounding atmosphere frequently is contaminated by a heavy odor of petroleum. Patients with respiratory allergy unable to tolerate noxious odors are often worse after visiting or traveling through this area. A similar set of circumstances exists in the radio and smelting industries where the odor of solder or those resulting from the smelting of ores gives rise to odors that are non-specific aggravating factors in selected groups of allergic patients. The lint from cotton and wool used in the textile industry adversely affects some of the operators who have allergic coryza and/or asthma so that it becomes necessary to alter their industrial environment to avoid these agents

Many cases of miner's asthma result from employment in the anthracite region of Northeastern Pennsylvania In reality these are cases of *pneumoconiosis* with secondary bronchospasm. This latter trait is often manifest only after the development of pulmonary failure, which in turn is the result of pulmonary fibrosis and emphysema The silicosis problem, once rampant in this area, has been adequately controlled by improved hygenic conditions including ventilation, compulsory wearing of protective masks or respirators and rest periods several times a day.

The mushroom fly *(Aphiochaeta Agarici)* that is disseminated when the manure piles are turned *(April and October)* gives rise to allergic coryza and asthma. Most of the patients so afflicted reside in the Kennet Square district of Southeastern Pennsylvania which is the prime mushroom center of the country.

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Aerobiological Survey conducted by
Jay Spiegelman, M D and G I Blumstein, M D
(Allergy Clinic—Mt. Sinai Hospital, Philadelphia, Pa)

Before discussing the various pollen and mold seasons, it might be well to point out the discrepancy that exists between the findings of the pollen collector and those of the atmospheric sampler. The former is able to give us accurate pollinating dates for every pollen producing plant, while the latter merely identifies the type and quantity of atmospheric pollen deposited on the slide at a given station. The wide discrepancy between them may be explained by the location of the shelter, by local plants whose pollen is not widely distributed either as result of its limited production or poor dissemination resulting from the character of the pollen, or because of local distribution of the plant itself. Pollen collectors thus are able to give us a much larger list of air disseminated pollens together with their periods of pollination while the atmospheric survey indicates those that are most widely distributed and thus most important clinically. The latter correlates best with the clinical findings and is much less confusing to the physician.

Tree pollens may sometimes be found in the atmosphere as early as February but the type and quantity found are insignificant since they seldom produce clinical symptoms The principal hay fever producing tree pollens in the Philadelphia area are oak and sycamore. Occasional cases of early tree hay fever may be encountered and are caused by the early pollinating trees such as elm, maple, poplar and birch. Clinical symptoms correlate well with the maximum period of pollination, namely, late April to mid June. The symptoms are quite severe and frequently include asthma, for these trees are prolific pollen producers and are abundantly and widely distributed in this area

The grasses start to pollinate in early May, reach their peak production around Memorial Day and the first week in June, then taper off after July 4. The important grasses are timothy, sweet vernal, orchard, redtop and June grass One may use either a mixture of these grasses or a timothy extract alone for testing and treating such cases. Attempts to differentiate the relative aerial abundance of the pollens of these various grasses

is fraught with too many errors to be practical. It is to be remembered also that the pollination periods of such trees as sycamore as well as that of English plantain, a weed, overlaps the pollinating period of these grasses Unless this is realized, it may lead to improper diagnosis and to poor therapeutic results.

The mold season is one that is often neglected and deserves more attention than it has received in the past. Allergy to molds now has been found responsible for many previously undiagnosed summer asthmas giving negative skin test reactions to pollens, also for those patients who were considered to be sensitive to pollens only but who failed to obtain adequate relief when given pollen desensitization alone. The period of mold sporulation does not correspond to the pollinating period of any single plant or group of plants. Furthermore, airborne spores are very abundant during July, a time when there is comparatively little pollen of any sort in the atmosphere. Patients presenting symptoms at that time should be suspected of having mold allergy and should be investigated accordingly not only with skin tests but also, if necessary, by provocative nasal tests This would include particularly those patients with *seasonal* bronchitis or asthma and minimal hay fever symptoms, since fungus spores seem to have a particular affinity for the bronchial mucosa While varying types of fungus spores may be found in the atmosphere by the culture method at any time of the year, we have not been able to indict molds as a cause of perennial coryza or asthma As is evident in the chart, the most important seasonal atmospheric molds are *Alternaria* and *Hormodendrum* with *Alternaria* predominant It is therefore essential that all patients with seasonal hay fever and asthma be tested routinely with extracts of these molds

The weed season begins on August 15, reaches its peak in late August or early September and disappears with the first frost (about October 1) In this area short and giant ragweed are most important Cocklebur and lamb's quarters though seen during the season on our pollen slides are of little etiologic importance in our patients. One often sees patients with

asthmatic symptoms attributed to pollen allergy but apparently having no relationship to the atmospheric pollen concentration. In fact, their asthma begins in mid September, at a time when the pollen concentration is rapidly diminishing. In our experience, the asthma in these patients seems related to meteorological changes as previously described and occurs in ragweed-sensitive patients only after the pollen has exerted its primary irritating effect upon the nasal and bronchial mucosa. By contrast, similar weather conditions at other times of the year fail to evoke such reactions in the same patients.

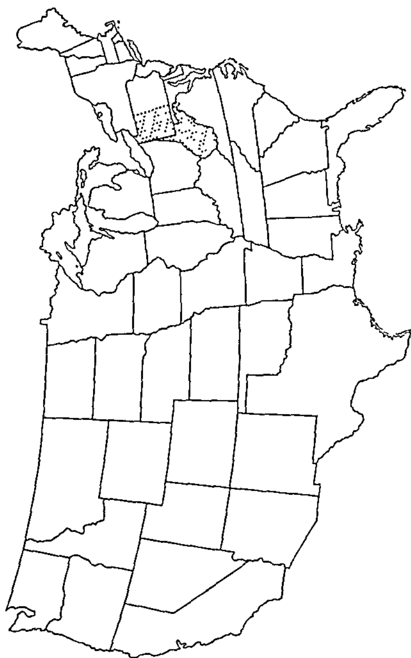
6

Western Pennsylvania and West Virginia

By Leo H. Criep, M.D., and Morton L. Hammond, M.D.

Environmental conditions affect the course of allergic disorders Following is a summary of various regional factors as they apply to Western Pennsylvania and West Virginia. These include geography, climate, air pollutants, industry and several other factors.

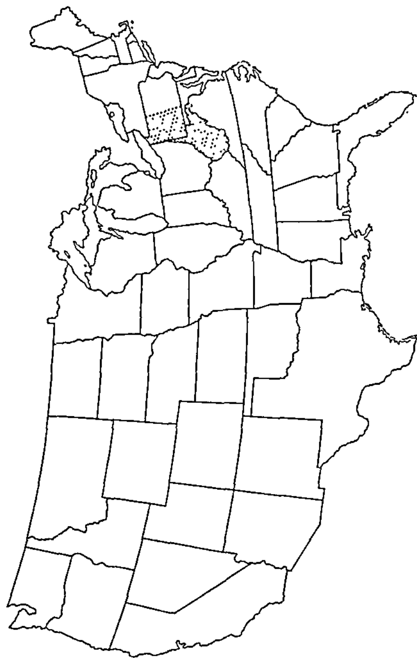
Geography. The Pittsburgh District as representative of Western Pennsylvania, is an area surrounded by a zone of industrialization including Beaver, East Liverpool, New Castle and Youngstown to the west and north, Washington and Wheeling and Uniontown to the south, Johnstown to the east and many other industrial areas (Fig. 1). All of these areas lie in what physiographers call a "dissected plateau"; however, the local habit of calling the high points "hills" and the low points "valleys" is more understandable In these terms practically all of the inhabited areas are in "valleys" as for instance, McKeesport in the Youghiogheny Valley, Youngstown in the Mahoning Valley, Wheeling in the Ohio River Valley, etc. Actually Western Pennsylvania, contrary to popular impression, is not a mountain region, but is rather a large plateau established at a relatively uniform elevation of 1200 feet with occasional knobs as high as 1360 feet and terraces (along the rivers) as low as 1150 feet This plateau area has been cut in ridges by the Youghiogheny, Allegheny, and Ohio Rivers and many ancient streams and rivers that have long since disappeared Hence one can say accurately that the populated zones are in the ditches and gorges cut into this plateau. These gorges



are technically and actually not valleys since a valley is a hollow between hills, and "there are no hills within 50 miles of Pittsburgh." In effect, however, the terrain is rugged, rough and as a result there are marked climatic differences within very short distances. Temperature, for instance, may vary 5° to 10° lower in the so called "valleys" as compared to the highlands This fact allows for fogs in the gorges while the evening is clear and balmy on the hillsides. On the other hand, there may be high winds on the hill tops while winds are almost imperceptible along the low lying terraces

Pittsburgh itself lies between the limbs of the Allegheny and Monongahela Rivers The wedge-like "Golden Triangle," the heart of Pittsburgh, is located at the junction of these two rivers As the city has grown the population has overflowed the river boundaries and as a result there is an ever increasing north side and south side concentration of people Both of these zones are quite "hilly" The rivers run in a generally westerly direction near Pittsburgh and form the Ohio. This river at first runs a slightly northerly course then bends sharply south to meet the Mississippi. The Ohio River Valley is the site of heavy concentrations of industry and the resultant smoke and air contaminants play a role in the health pattern of the community through both air and water pollution. This will be discussed later.

Climate The location of Pittsburgh at a central zone with good waterways and tremendous natural resources resulted in populating of the area despite the drawbacks of a rough and difficult terrain and its location in the route of many storm tracts that offer adverse climatic conditions for some illnesses. In general, the climate is temperate. However, there are about 10 major storm tracts that cross the United States and seven of these come close enough to Pittsburgh to materially influence the weather In general, these storms emerging from many different locations, bring low barometric pressures attended by cloudy and rainy weather followed characteristically by high pressure areas with clear skies and lower temperatures. Most of these storm tracts converge at the North Atlantic



esting averages showing the basic temperance of the region. For instance, there are about 100 days below freezing, but only two days of sub-zero cold per year. January is the coldest month with a mean of 31°, (about the same as Philadelphia, somewhat colder than Baltimore, but warmer than Boston or Chicago) Average yearly temperatures vary from a low of 44° to a high of 62° with a yearly average of 53°. The unpleasant feature, however, is the temperature extreme over short time intervals with a 50° difference between the high and low for the month and mean daily range of 20°. Variations of 30-35° in one 24 hour period are not uncommon. These figures do not set Western Pennsylvania apart from other areas. However, it is a factor in aggravating certain illnesses in our patient population. There are 16 days at or above 90° per year, and July (the warmest month) has a mean of 74°. The last frost is about April 23, and the first killing frost about October 21. Erie has about two extra weeks of fall because the Great Lakes moderate the temperature somewhat. The sun is out 50% of the possible sunshine and two-thirds of our days have at least one-half the sky free of clouds.

There are 25-30 dense fogs a year as a result of meteorologic factors to be discussed later. The relationship of fog per se to health is due perhaps in part to the increased breathing resistance that the moisture imparts to the air, but most of the symptoms complained of during fogs are a product of the associated meteorologic effects The fogs generally clear by 10 a.m. Smog results when smoke and industrial contaminants are included in the fog layer With the advent of smoke control this may perhaps be reduced by regulation of smoke stack height, filtration methods, etc, but as yet control is not totally effective In this regard, it is estimated that there are 1000 tons of dust per square mile a year in the Pittsburgh Area, prior to smoke control attempts.

Humidity also influences respiratory disease as a factor of increased breathing resistance Yearly average in this area approximates 75% in early morning and about 60% during the day There is no single humidity level that can be called an

Coast and have the effect in the Pittsburgh Area of causing rapidly changing weather conditions. They also account for the lack of "stability," meteorologically speaking, that helps to maintain the air free of pollutants. It is, therefore, not without some blessing that we are in a storm belt.

In spite of this, weather bureau reports indicate some inter-

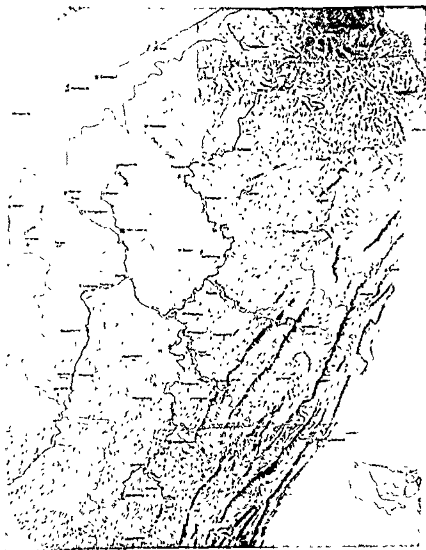


Fig 1

in urban communities, and finally nature itself has contributed to the contamination of the air by means of wind storms and the production of pollens, molds, dusts, etc.

Man made smoke control and dust filtering devices are relatively ineffectual in keeping our air clean but are nevertheless important in some locations. It has been particularly effective in Pittsburgh where the heavy smogs are almost unknown at this time.

Natural methods of cleaning the air includes actual removal of particulate matter by rain or snow All other means of cleaning the air actually amount to dispersal or dilution of contaminants There may be horizontal dispersion by wind and this depends upon wind velocity and direction Wind over 1000 feet is relatively steady and predominantly from the west Below 1000 feet, with frictional drags and rough broken terrain, local movements are complex and convulsive The interaction of wind, mechanical friction and thermal currents result in turbulance

There may be upward dispersion of contaminants brought about by the temperature conditions of earth and air. This is dependent on changes in barometric pressure as well as on conditions such as inversions, stability, and turbulence For instance, considering the temperature factor alone, we can see that if air at a higher level is cooler than low level air, there will be a condition of instability and ground level air will rise. If, however, high level air is warmer than the air in contact with the ground, then the ground level air remains in place and so will all the contaminants present. This state of affairs is encouraged by the cooling of the ground by radiation Radiant heat of this nature would warm the upper air levels while at the same time there is cooling of the lower air levels by contact with the cooled ground. This develops mostly at night, especially on cloudless nights where the reflected heat from cloud banks is at a minimum In hilly areas and along river valleys, conditions of inversion are increased in frequency because cold air drains into these valleys seeking lower levels and at the same time there is protection from winds by the adjacent hills which

optimum, or comfortable level, because a given moisture content in the air may be comfortable at one temperature and uncomfortable at another. In general, cold air seems colder and warm air seems warmer under conditions of increased humidity.

About 98% of the people will be comfortable in winter with a temperature of 68° and a humidity of 70%. A temperature of 72° with a humidity of 30% would likewise be comfortable. The temperatures and humidity levels between these extremes are called the comfort level. In summer one can be comfortable with a temperature of 79° with a humidity of 30% and the varying levels between. Pittsburgh approaches these average figures for about five months out of the year. Two out of three days are rain free and the wet one-third includes about 35 snowy days. November is quite dry, and July quite wet. There are several inches less rain here than in New York. Average winds are from the Northwest and are six miles per hour at ground level and about 11 miles per hour higher up. However, winds of 40 miles per hour are not uncommon. All of these factors are important only in terms of their non-specific mechanical or physical effects on disease and the indirect effects as it contributes to atmospheric pollutants. Pollutants include of course not only industrial dusts and gasses but natural elements of pollens, mold, etc.

Contaminants. The source of air contaminants in this area is a reflection of the many industrial pursuits seen here. Combustion associated with incinerators and industrial operations contribute substantially to air pollution. The industrial range in this area include the preparation and fabrication of steel and iron, food, chemical and paper factories and glass plants. In addition there are factories for paints (17), plastics (6), soap (12), tar products (26), quarries (500), manufacturing, etc. (247,000), and mines (10,000)

Traffic and the resultant combustion of fuel aid in contamination. Building and highway construction are other pursuits that help pollute the air we breathe. Coal contaminants, tar, sulfur, fluorine, soot and ash, are particularly bothersome

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would ordinarily tend to mix the air. For these reasons ground fogs are found often throughout the Appalacian Area and the Allegheny Area. These occur at times when moisture in the air is marked (June, July, August, and September) and mostly toward the end of August and September because of longer nights and lower ground temperatures. They are worse in West Virginia (which has the greater number of days per year with fog). In other words, stability occurs when ground level air is cooler than air at higher levels Under these conditions the cold air does not rise and there is stagnation, barring other complicating factors such as wind, rain, etc. Industrial wastes, dust and pollen accumulate in this stagnant area with resultant aggravation of respiratory complaints

One is less apt to have this type of stability when stormy conditions exist because the associated wind and rain are cleansing in action. Hence, trouble during winter months is probably not due to this type of mechanism Other factors are responsible for the high incidence of symptoms during these months. Similarly, the summer months are not very disturbing (excepting in pollen cases) because of the increased upward dispersion related to warm lower levels of air. These lower level temperatures are raised by contact with warm ground High pressure areas move slowly in the fall and the spring and these seasons are apt to be bad times for patients with respiratory disease first because the protective ground heat is not as potent a factor in accentuating upward dispersion of materials as it is during the summer, and secondly because there are less wind and rain during these seasons than in the winter.

Up to this point we have been concerned with the recognition of the source of contaminants and the means by which we dispose of these pollutants A consideration of the particulate matter itself may now be in order The industrial irritants require little comment since this is obviously a non-specific effect which serves to aggravate rather than to cause respiratory disease. The flora of vegetation and molds however require further consideration

Atmospheric pollen studies in Western Pennsylvania have

been done and reported previously. There is no appreciable degree of pollination until late in February. The time of pollination varies for Western Pennsylvania, depending on latitude, altitude, temperature, etc. For instance, the pollinating

POLLENS OCCURRING CHIEFLY IN EARLY SPRING

Early Flowering Trees (February to the middle of April)

Alder	February-March
Hazelnut	February-March
Silver maple	February-March
American elm	March-April
Poplar	March-April
Red maple	March-April
Slippery elm	March-April
Willow	March-April

Late Flowering Trees (middle of April to end of June)

Ash	April-May
Birch	April-May
Box elder	April-May
Oak	April-May
Sugar maple	April-May
Walnut	April-May
Beech	May
Hickory	May
Mulberry	May
Sycamore	May
Ailanthus	June
Linden	June

periods are about three weeks later in Meadville than in Pittsburgh and about five weeks later in Erie. Several peculiarities may be noted in the results of slide surveys *First*, that there is no appreciable poplar pollen reported although poplar, or cottonwood, is a common Western Pennsylvania tree. Sec-

ondly, that birch is generally heavier in the northern localities and walnut is somewhat less there as compared to Pittsburgh. One may explain this discrepancy perhaps by referring to the difficulty in recognition of the various tree pollen. The absence of poplar on slide studies may well be a case of mistaken identity in which the poplar pollen has been mistaken for elm or something else. Many cultivated poplars have sterile catkins. In addition, evaluation of the pattern of tree pollination cannot always be properly done by depending on slide count since the dispersion of pollen may be relatively local with dissemination only within a limited radius of the tree. Trees probably have the effect of creating "pockets of influence." In general, the pollinating period for trees is late February till early June (linden, ailanthus) and that of grasses is from late May through June and gradually reducing in number till August. Weeds are prevalent from July to October although some pollinate as early as May. Among the common trees one can find elm, sycamore, maple, birch, and poplar. These are the more common urban trees, however, other trees are commonly a factor of allergy in rural areas and include the alders, ash, beech, birch, elm, hazelnut, hickory, linden, maple, oak, sycamore, poplar, walnut, and willow. These are general statements, nevertheless, in certain localities one or another of the uncommon trees may be flourishing in abundance and the pollen may be locally significant. For instance, the cottonwood is especially offensive as an allergen along the shores of Lake Erie Other areas may have a lot of pine. On the peaks of our elevations there may be birch and larch. The hemlock is found in moist ravines and may be higher on the hillside as we go north The pitch pine and rock oak are characteristically found on rocky ridges and on uplands, whereas the elm, sycamore, and the white oak demand a moist soil The poplar is found in abundance along streams and the maple in heavy clay soil that does not drain readily. The early trees are elms, maples, poplar, alder, hazelnut. These pollinate by April 21. The late trees are walnut, oaks, sycamore, ash, birch, beech, linden, hickory, and tree of heaven (mostly insect pollinated).

There are six common allergenic grasses in Western Pennsylvania. They are timothy, orchard grass, redtop, June grass (bluegrass), Canada bluegrass, and sweet vernal grass. Timo-

POLLEN GRAINS OCCURRING CHIEFLY IN LATE SPRING AND EARLY SUMMER

Grasses

Annual spear grass	Beginning in May
Canada blue grass	" " May
Kentucky blue grass	" " May
Orchard grass	" " May
Timothy grass	" " May
Crab grass	" " June
Meadow fescue	" " June
Quack grass	" " June
Perennial rye grass	" " June
Redtop grass	" " June
Sweet vernal	" " June

Weeds

Common plantain	Beginning in May
English plantain	" " May
Dock	" " June
Pigweed	" " June
Sheep sorrel	" " June
Annual wormwood	Beginning late in June
Cocklebur	Beginning late in June
Mexican tea	Beginning late in June
Giant ragweed	Beginning late in July
Short ragweed	Beginning late in July
Lamb's quarters	Beginning late in August

thy, orchard grass, and redtop are important meadow and forage grasses Among scores of other grasses present, but of less clinical significance, are velvet grass, spear grass, crab grass, quack grass, rye, meadow fescue On golf courses one

finds creeping bent and velvet bent. Wheat, oat, and rye are local factors.

The earliest weeds are English plantain and sheep sorrel which appear in June. The latter is abundant but unimportant clinically. Pigweed *(Amaranthus spp.)* and lamb's quarters *(Chenopodium spp.)* are abundant from July to October but produce very little pollen and are of doubtful sensitizing quality. Short ragweed, giant ragweed, and cocklebur reach anthesis in early August and continue until mid October. The first two produce more than 98% of all pollen from all sources during the late summer and fall.

Attached is pollen survey of Pittsburgh. Note the similarity of the region over wide areas. However, the day to day correlation with temperature, wind, humidity, time of day, etc. offer specific impressions. On March 10, 1951 a frost was followed by two days of snow and maple pollination dropped to very low levels as a result. Heat from March 27-30 was associated with a marked increase in tree pollen (180 elm in the three days) Windy days were invariably associated with high pollen levels. Rainy days were associated with high mold counts for a day or two thereafter.

A résumé of the climatic and special geographic nature of the region allows us the following conclusion:

1. Pittsburgh is in a point of convergence of many storm tracks and hence is subject to variable weather conditions. This adversely affects patients with sensitive vasomotor responses of the respiratory mucous membranes, but on the other hand is helpful in dispersing harmful industrial air contaminants.

2. Average temperatures are temperate but in general there is a tendency toward moderate cold with one-third of the year at below freezing This in itself is not disturbing from a patient health point of view However, the 24 hour variation of about 20° is often disturbing from a patient health point of view

3 Fog influences patient health probably through its effect on breathing resistance. Furthermore, its presence is indicative of the fact that a condition of meteorologic stability exists Hence non specific and specific inhalant contaminants will

likewise be concentrated in the given area. Finally the pollen particles adhere to droplets of moisture and it is quite possible that the water soluble antigens may be extracted and serve as more effective allergens Fog dispersion by winds and rains

TABLE I

PITTSBURGH, PENNSYLVANIA

(Aspinwall)

1951

	Mar	Apr.	May	June	July	Aug	Sept.	Oct.	Total
Pollens (cubic yard basis)									
Poplar	3								3
Alder	4	1							5
Maple	13	2							15
Willow	8	6	2						16
Hickory	1	2	1						4
Elm	234	494	16						744
Birch	7	20	5						32
Beech	1	1	101						103
Ash			26						28
Sycamore			263	4					267
Oak		7	354	1					362
Walnut	2		1	2					5
Pine		8	9	3					20
Ailanthus				1					1
Grass			62	220	109	3			394
Ragweed					8	866	704	23	1601
Unidentified	7	20	52	13	3	9	3		107
Molds (square centimeter basis)									
Alternaria	2	1	4	3	36	51	53		150
Hormodendrum—single			3	6	15	7	14		45
Hormodendrum—clumped				4	15	5	7		31
Helminthosporium			1	1	17	17	22		58

tend to clear the air with resultant amelioration of patient complaints

4 Wind as a factor in influencing health is of extreme importance The winds in this area originate in the northwest. These winds accumulate in their course all the contaminants along the Ohio River Valley and from the Pittsburgh Point (hence they bathe the Golden Triangle and Pittsburgh proper

with an abundance of grit). Winds nevertheless are in the long run quite helpful, because they remove from the area wastes which might otherwise accumulate. However, since they stir up dusts before horizontal dispersion is affected, they contribute to much discomfort during this preliminary period. In the same manner the storms are effective in clearing the air. However, the low barometric pressures that precede the actual storm allows all particulate matter that ordinarily hugs the ground to float a little higher and hence patients are breathing a higher concentration of the usually low lying contaminants.

5. Agricultural factors and industrial factors are of importance only locally and non specifically. In this regard it must be emphasized that the smoke control practice in Pittsburgh has been a huge success with about a 75% decrease in the amount of smoke and grit in the air. The city now compares favorably with other industrial cities as far as cleanliness is concerned.

6. In general, our most disturbing trees are the elm, maple, and sycamore and the most aggravating grasses are timothy and redtop, with the most bothersome weeds being ragweed and English plantain. The outdoor molds of clinical significance are *Alternaria, Hormodendrum,* and occasionally *Helminthosporium.* The indoor molds of great significance are the *Aspergillus* and *Penicillium* and *Monilia.*

The specific climatic problems of Western Pennsylvania suggest a brief discussion on the effect of climate in general on respiratory and skin allergy which was first recognized and reported nearly 250 years ago Peterson's classical studies on weather and disease in 1943 indicate the increased incidence of asthmatic deaths coincident with dropping of barometric pressure. The mechanism by which these weather changes are effective has been and still is, somewhat of a mystery. However, there are certain physiologic and mechanical effects that may play a role

Coincident with dropping barometric pressures there is an increase in "nose level" contaminants which previously hugged

the ground but which float higher as the barometric pressure decreases. At the same time the superficial vessels of the skin and mucous membranes are allowed greater expansion and dilatation because of the decreased pressure exerted upon the surface This has an effect similar to that of going to high altitudes suddenly, or of coming up from below seas without

TABLE II
POLLEN RECORD FOR MEADVILLE, PA
1950

	Jan	*Feb*	*Mar*	*Apr*	*May*	*June*	*July*	*Aug*	*Sept.*	*Oct.*	*Nov.*	*Dec.*	*Total*
Elm			25	451	38								514
Willow			8	6	1								15
Birch			7	25	830	12							874
Sycamore			1	85	20								106
Maple			2	37	396								435
Alder			3	23	1								27
Walnut				3	1								4
Hickory					65	61							126
Hemlock					31	1							32
Oak					166	24							190
Privet						13	1						14
Cattail							2						2
English plantain					6	77							83
Grass					1151	1186	458	43					2838
Corn								3	2				5
Ragweed							9	2992	1333	25			4359
Composite									10	1			11
Miscellaneous					95	3			6	1			105

Record by Luther J King, M D.

benefit of diving chambers Finally, there are sudden temperature and humidity changes with the so called "polar fronts" that are an additional insult in the pre-storm period On the other hand, storms and winds are one means of clearing the air of contaminants and frequently it is apparent that long storm free periods are associated with an aggravation of allergic symptoms

Temperature alone may work to the advantage or disadvantage of patients. The obvious effect of hot moist air is to

with an abundance of grit). Winds nevertheless are in the long run quite helpful, because they remove from the area wastes which might otherwise accumulate. However, since they stir up dusts before horizontal dispersion is affected, they contribute to much discomfort during this preliminary period. In the same manner the storms are effective in clearing the air. However, the low barometric pressures that precede the actual storm allows all particulate matter that ordinarily hugs the ground to float a little higher and hence patients are breathing a higher concentration of the usually low lying contaminants.

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wheat sensitive patients should not work in bakeries, wool sensitive patients in clothing establishments, etc. Likewise, the non specific irritants of industrial operations may be disturbing. Such patients may find relief by moving to another section of the city Similarly, the local environmental factor may be relieved by a change in the heating mechanism in a given house and in this, the radiation versus conduction types of heat are of importance Again, a given house may have a high mold count. The patient may be relieved by simply moving to another house or buying new furniture. Finally one must mention spa or climatic changes and therapy and its economic implications and practical value. One cannot uproot established familial roots without destroying some emotional adjustments and thus on the "chance" that climatic changes will be helpful. In general one would be safe in saying that any location that is free of non-specific industrial irritants, that has a fairly low humidity factor without a high temperature but also without startling temperature variation would be *an ideal location* for respiratory allergic patients However, each allergic patient must be evaluated individually in order to determine the *relative* value of uprooting the patient from his home and the benefit to be derived from such a change Ideally, a prolonged visit would first be desirable and this is within the reach of the wealthy only

At this point it is fitting to mention that Western Pennsylvania enjoys what is advertised as a ragweed *free resort* This resort, Kane, Pennsylvania, is located in Northwestern Pennsylvania and actually is not ragweed free However, it is said there is less ragweed there than in other areas of the State The reason for this is self-evident in that this is in the midst of a tremendous *forest area* and ragweed does not grow well, if at all, in the cool moist, shaded and uncultivated forest soil However, in Kane there is ragweed *sufficient* to cause symptoms in very *sensitive patients*, the very patients who would be seeking spa therapy The more mildly sensitive patient would be benefited, but are unlikely to be *seeking* spa therapy.

In this regard it may be worth stating that patients who do

increase the rate and depth of respiration in an effort to maintain body heat at a proper level and to increase the vascularity and warmth of the skin for similar physiologic effects Both of these mechanisms have undesirable effects on the allergic individual. The added respiratory effort regardless of the cause can aggravate or precipitate asthmatic seizures. This is seen commonly with exercise but heat too can cause identical effects. The effect of heat on the skin is well recognized. It probably has its effect through irritation and maceration occasioned by sweating or perhaps by increasing the vascularity of the skin so that there is a resultant increase in the concentration of allergens locally. On the other hand, hot dry climates are said to exert a beneficial effect on nasal and para nasal inflammatory conditions and on some allergic manifestations. This may well be, however, some allergic conditions may be also aggravated. The increased viscosity of nasal and bronchial secretions increases the difficulty of proper drainage.

The humidity factor is of specific interest in this connection Warmth in association with high humidity is not helpful but is apt to be distressing to many patients.

This may be due not only to increased breathing resistance of moisture laden air but also to the increased mold content of the air as well as the actual dissolution of particulate matter in fine moisture particles to make these droplets immediately soluble and perhaps more potent as allergens. In addition there is, in the high humidity and fog belts, a relative stagnation of air with accumulation of particulate contaminants which may be distressing. It may be well to note that humidity must be evaluated in reference to the dew point and temperature since a fixed humidity can be uncomfortable if the temperature be relatively low and the moisture in the air almost at saturation point. It should be noted that the same humidity in association with a higher temperature may be comfortable because the air is not near its saturation point.

Effects of local pollutants on respiratory and skin allergy is of interest in that change in environment offers a simple expedient in obtaining relief of symptoms Thus it is obvious that

7

Eastern Ohio

By JONATHAN FORMAN, B.A., M.D.

THE REGION covered in this section begins in the extreme northeastern part of Ohio at the Pennsylvania line and extends westward along the shores of Lake Erie to the western boundary of Erie County (Sandusky, Ohio) and thence south through the western edge of Franklin County (Columbus, Ohio) and on down to Scioto County (Portsmouth, Ohio) on the Ohio River and thence eastward in a northerly direction along the river to the Pennsylvania border.

Geography. This region covers roughly the wooded section of the State, extending in spots to the beginnings of the prairie country on the west It is divided into the northern, glaciated, and the southern non-glaciated lands

Ohio has no great elevations (from 430 to 1550 feet above sea level). The drainage is either northerly into Lake Erie or southerly into the Ohio river. The divide between the two drainage areas lies well to the north of the middle of the State and in the northeastern part of this region is as little as 20 miles from the shores of Lake Erie Two river valleys traverse from north to south the southern three-fourths of the State in their journey to join the Ohio—the Scioto at the western edge and the Muskingum through the eastern half. Both of these in recent years have killed a goodly number of the citizens and caused millions of dollars worth of damage as they went on their annual rampage In the pioneer days, floods came once in 100 years or so but as soon as the forests were cut down the uncontrolled run-off from rains gave high waters and the floods became bigger and bigger as the river beds became clogged with silt.

avoid pollen should do so for the entire season because coming back from a pollen free area to an area with a high pollen count may be an unbearable insult to their mucous membranes. If it becomes necessary therefore to advise a patient to move to another part of the country, permanently in order to avoid adverse exposure, such advice should be given only after the physician has considered very carefully the economic and social factors in each individual case. Many serious tragedies may be avoided by such a procedure. The availability of proper medical care, opportunities for earning a livelihood, removal from family and friends, are considerations which may effect that patient so adversely in his new location that the new climate may actually do him very little good.

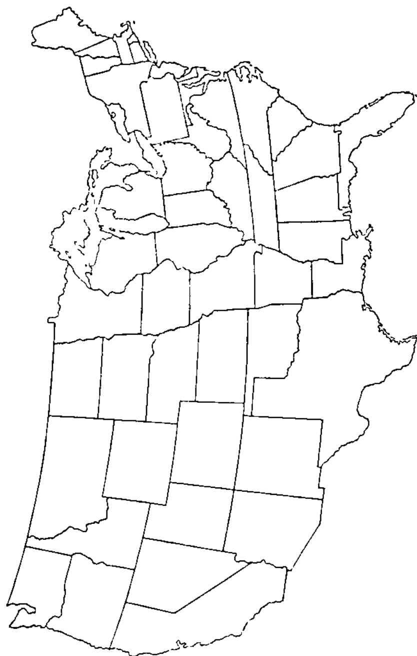
Several pertinent things may be kept in mind in advising one's patients who are building or buying homes in selecting a proper location. They should avoid fog ridden valleys, areas near swampland and near industrial operations. In evaluating a location they should also consider effects of the prevailing winds, the geographic location of rivers and valleys, etc.

Chemical and environmental factors play an important role in the etiology of allergic conditions as might well be expected. Climatic changes contribute to the severity of allergies of the respiratory tract. There is considerable evidence to indicate that fluctuation of barometric pressure, has a definite effect on an individual's sense of well being. Furthermore, these fluctuations seem to affect most of the body functions and are manifest often as symptoms of disease. This seems to be particularly true with reference to respiratory allergy. Changeable weather, low barometric pressure, fog and increased humidity always aggravate the extent and severity of respiratory disease. Wind, temperature, environmental exposure to air pollutants, mechanical and chemical irritants are also etiologically important Indeed there appears to be such a multiplicity of geographic, climatic and enviromental conditions that affect the allergic patient that their proper evaluation in a given case is well nigh impossible.

As a result of the glaciation in the remote past, the northern portion of this region is rolling, while the southern, non-glaciated area is rough, hilly, and badly eroded. By nature the non-glaciated part is suitable for hardwood forests. When the original settlers came into the southern two-thirds by way of Pittsburgh, Wheeling and the Ohio River, they were confronted with the task of clearing off these forests if they wanted to plant the crops their culture demanded. This was a stupendous, back-breaking task and they soon came to hate the trees much as we moderns still retaining the same mistaken attitude toward nature hate the weeds in our gardens. The early settlers brought with them an open row type of agriculture with their potatoes, corn, gardens and a little tobacco along the Ohio, the very same that had ruined their farm lands back east. This scalping of the newly cleared areas and then up-and-down-the-hill cultivation hastened the movement of the topsoil into the Ohio river As a result of 100 years of this type of agriculture one-half to three-fourths of the topsoil has been washed into the Gulf of Mexico, leaving a once prosperous farming country poor indeed and its people a burden on the State

In the last 15 years, however, under the leadership of such organizations as *Friends of the Land* and the *Ohio Forestry Association*, much is being done to restore the land that is fundamentally suitable for cropping and to reforest that which is not More recently, this movement of conservation and restoration has been slowed somewhat by the great rush of new industries into the valleys of the Muskingum, the Scioto, and the Ohio River itself

Climate. Ohio enjoys a climate that is characterized by an abundant rainfall, well distributed throughout the year. Serious droughts are infrequent in their occurrence Summer temperatures are rather high but not unduly oppressive. They, however, do afford a good growing season and are therefore an important factor in the development of Ohio's agriculture. Winter temperatures likewise are as a rule not severe and snowfall is moderate in almost all sections of the State (except



Eastern Ohio. He can live with them as well as anyone. If they become disturbing, then it is time for a re-check to see where his management program has broken down. Used in this way, the storm fronts become a blessing

By way of conclusion, we can say that the climate of the eastern half of Ohio is favorable for the diversified type of agriculture which it supports, that the humidity along the shores of Lake Erie and along the banks of the Ohio is not unfavorable to the allergic person who is properly managing his life and whose physician has the allergic manifestations under control

Resources. This area is predominantly a hardwood area Certain pines and hemlocks, however, do occur naturally and have produced excellent lumber in the past. The varied topography, the variation in soils, the variance in climate between the northern and southern extremities, the previous glaciation, or the lack of it, are all factors which have a marked effect on the vegetation and account for the wide range of timber species that are native to the area. North central counties are the southern limits of natural white pine growth while the southern hill counties mark the northern limits of the short leaf or southern yellow pine The same situation, in a lesser degree, prevails among the hardwoods. The northern two or three counties have for their major forest types the beech and the maple This is also true of the western tier of counties from Sandusky to Columbus and then again along a line about 30 miles wide from Columbus to St. Clairsville. On the other hand a strip of about 25 miles in width, from just east of Mt. Vernon straight to the Ohio river and thence along the river and spreading out to occupy the southern portion of the region, is a mixed oak and hickory country. From the viewpoint of both industry and allergy the more important hardwood species are white and red oak, white ash, hard maple, black walnut, tulip poplar, basswood, hickory, and beech With the advent of pulp conversion industries, certain other hardwood species have assumed commercial values These include soft maple, buckeye, sycamore, willow, cottonwood and birch

Geauga County, just southeast of Cleveland). Destructive storms seldom occur.

The average rainfall is 37 inches. The greatest annual snowfall, over 50 inches, occurs along the drainage divide and the least, less than 20 inches, along the banks of the Ohio. The average number of days with a measurable amount of precipitation is 120 of the 365. During the year, there is also an average of 134 clear days, 107 which are partly cloudy and 124 which are definitely cloudy. In the north, the influence of Lake Erie is quite apparent by the lengthening of the growing season and also in the comparatively greater amount of rainfall and snowfall in the northern highlands.

The mean annual temperature ranges from 55° in the extreme south to 48° in the northeast corner. In about one year in eight, no weather station in the State records a temperature reading below zero while, in about one year in three, no station has a reading of above 100° in the month of July. The absolute temperature range for the region is 152 degrees.

On the other hand, this region is so situated as to come under the influence of many great storm centers and the development of many local disturbances, such as thunderstorms, hailstorms, windstorms and heavy rainstorms, is thus favored. Only very rarely does one of these storms develop the characteristics of a tornado. The heaviest rains and the highest winds are usually incidental to the passage of a thunderstorm. Any given locality in this region may expect to have on the average from 40 to 50 thunderstorms each year.

All students of the allergic person know of the unfavorable effects that the passage of one of these storm fronts has upon the symptoms of the victim While all uncontrolled allergics are affected by these changes in the weather, the asthmatic is especially responsive. Many asthmatics in this area are convinced that the weather is the *real* cause of their trouble. Such, however, is not the case The changes in the barometric pressure and in the humidity are in fact secondary, or precipitating factors. The allergic individual whose allergies are under proper management and control can discount the storms of

sary for satisfactory use Furthermore, the deep-seated rocks yield petroleum, natural gas and salt brine. There are also very extensive layers of oil-bearing shale underneath the southern two-thirds of the region waiting for necessity to teach us how to extract the oil economically. In a general way, almost all of Ohio's coal-bearing area, comprising some 12,430 square miles, is in this region Much of it is subject to strip mining. At present this is being done under proper state regulation requiring the spoil banks that are left behind to be reclaimed. The old spoil banks are being reforested through a cooperative effort of the mining interests by The Ohio Reclamation Association.

Industries. The recitation of these resources and their uses is necessary, not only to understand what opportunities for a livelihood one might have if one were to move into the region but also what exposures an allergic person is likely to encounter by working in or living near the various industrial plants

The rise of Ohio to an eminent position in the production of ceramic products may be attributed to the abundance of clays and shales over extensive areas, to their excellent working properties, to their fitness for making a wide variety of useful wares, to the plentifulness of fuel and to the favorable position of Eastern Ohio to the markets of the nation. Stoneware, yellowware, Rockingham and Majolica have been made here since pioneer days from the coal formation clays of the southern half of this area These, together with sewer pipe and related products, refractory products, and tile, make up an industry yielding over $100,000,000 worth of articles each year Of course these clay working plants offer to the person with an allergic constitution working in them all of the disadvantages and dangers of a dusty trade with the additional danger of silicosis But if these dangers are appreciated this trouble may readily be avoided

Water is seldom recognized for what it is—our most precious mineral It is at the same time our cheapest and most recklessly used mineral resource There are many communities in this area which cannot support another industry or permit any

The most of Ohio's 9,500,000,000 board feet of standing timber lies in this part of the state. From this stand, Ohio is cutting 270,000,000 board feet of hardwood annually. This does not include pulpwood, wood for charcoal, hewed railroad ties, fence posts, fuel wood, and similar items

While Ohio passed the peak of its native lumber production in 1900, the volume of employment in the wood-working plants is still as great as it was then and the value of its manufactured wood products has increased greatly. The reason for this is that before the turn of the century most of the lumber used in the wood-working industry was made into such things as cooperage, bent wood products and the like, requiring relatively little labor and selling comparatively cheaply. Today, conversion and fabrication of wood into thousands of manufactured items employs far more labor per thousand feet of timber used and sold in 1940 for some $289,000,000.00

The future for Ohio's forests and woodlots is looking up Hence tree pollens will continue to plague the allergic in ever greater numbers. Intensive educational work to combat both fires and the grazing of woodlots is being extended. The advent of a state and national forest development program in this region is doing much to stabilize its future timber crops. These lands, lying almost wholly in the southern portion of this region, comprise extensive areas of second growth timber. An excellent stand of timber is rapidly being restored in the State and National Forests In addition to the present forested acres, there is another 1,500,000 acres of land formerly farmed in the rough hill country in the unglaciated portion of this region which will revert to timber growth in the near future

The mineral resources of this part of the state consist for the most part of the common rocks such as coal, clays (both flint and plastic), dolomite, marine and fresh-water limestones, conglomerate, iron ore, bog ore, marl and tufa rock, peat, gypsum, rock salt, sand, gravel, molding sand, flint, and water These resources are conveniently located and well distributed, usually present in large quantities, occurring under conditions favorable for their recovery, and, having the qualities neces-

rainfall would result in an increase in the ground water which would meet all of the needs of industry, city dwellers, and rural people for years to come.

Agriculture. With its favorable climate this region presents a diversified type of agriculture. A large percentage of its farm products is processed and consumed within the State, which ranks fifth in its farm income among the States of the Union.

There is likewise a wide variety of soils and considerable variance in climate so that there is nearly two weeks' difference in the coming of spring between the cities on the shores of Lake Erie and the towns along the Ohio. All of these factors have had a marked effect on the vegetation and consequently upon the cultures of the people who have grown up in the respective sections of the State

The glaciated northern portion produces oats, grapes (along the lake), maple sweets (Chardon claims to be the center of the maple syrup world), apples, peaches, chickens and predominantly dairy products It is in this area that we naturally are seeing a rapid change over to a grassland type of farming. The southern portion devotes itself to general farming, feeding of cattle, and the raising of sheep. The maintenance of good pastures has been taught to these farmers for almost two decades now and they are learning that it is only going to be through proper pasture management that they can expect to keep their topsoil, restore to it the fertility which they have lost through erosion, and make a respectable living through their improved agricultural practices.

Transportation. Ohio is located at the crossroads of the nation No other state is better situated or has beeter facilities for agricultural production and nearby markets and the same can be said for its industrial products There are within its borders 23 numbered Federal roads Five of these are transcontinental routes and four others do extend from coast to border. Overnight trucking from the center of this region reaches one-fourth of the total population of the nation Ohio has 79 cities with over 10,000 population rather uniformly over the State so that the demand for hard surface roads for communication, truck-

substantial growth in their population until they improve their water supply and that goes for the great steel centers as well as for some small county seats. The steel industry in the Cleveland-Youngstown District makes tremendous demands on the water supply as does the rubber industry in and around Akron. The paper industry at Chillicothe supplying, as it does, among other things, paper stock for *Colliers, Woman's Home Companion,* and *Life Magazine* uses over 75,000,000 gallons a day. Fortunately, it is situated over the bed of the preglacial Taas River—one of the richest sources of underground water. Timken Roller Bearing in its Canton plant alone requires an equal amount of water. The shortage, as well as the demands for some decades to come, can and should be corrected through proper soil conservation upstream.

In the meantime, the engineers are providing this area with an abundance of dams and reservoirs in which to store the surface run-off. Akron has the Portage Lakes, Youngstown its large reservoirs. On the Muskingum there are some 14 dams creating some 14 reservoirs that present in toto an excellent system of water storage, flood control, fishing and other recreational facilities, including a shoreline which exceeds that of the south shore of Lake Erie. Plans are being formulated for similar developments on the Scioto and its branches. There are already two large storage dams on the main body of the Scioto just above Columbus from which the city gets its water. Another has just been completed above Delaware on the Olentangy some 30 miles from where it joins the Scioto in Columbus. Northeast of Columbus, on the Big Walnut, the city is constructing another storage reservoir. But while these efforts are being made to catch a greater portion of the run-off, *the real hope for an adequate supply of water for the* region in the years ahead lies in the proper management through the use of more cover crops Fortunately, economic pressure and a shortage of manpower is driving the farmers to this type of agriculture. Wilbur Stout, the retired geologist of Ohio, has often pointed out that the catching and holding through in-soaking of as little as two-elevenths of the annual

Weeds

RAGWEED FAMILY
Cocklebur–2024
Xanthium pennsylvanicum Wallr
Giant Ragweed–2027
Ambrosia trifida L
Short Ragweed–2029
Ambrosia elatior L.
GOOSEFOOT FAMILY, 10 genera, 19 species and hybrids
Lamb's Quarters–1060
Chenopodium album L.
Mexican Tea–1069
Chenopodium ambrosioides L

AMARANTH FAMILY, including 5 Pigweed and 2 Water Hemp species
Rough Pigweed–1051
Amaranthus retroflexus L.
Water Hemp–1056
Acnida tuberculata Moq
BUCKWHEAT FAMILY, including only the *Rumex* genus, 9 species
Red Sorrel–1102
Rumex acetosella L.
PLANTAIN FAMILY, 8 species
English Plantain–1884
Plantago lanceolata L.
WORMWOODS
Annual Wormwood–2228
Artemisia annua L.

* Number refers to Schaffner's Vascular Plants of Ohio, 1932 The nomenclature follows that of Schaffner only in part.

ing and Ohio's farm produce has resulted in a network of farm-to-market secondary roads so that the State Highway System covers 18,490 miles while the county and township roads comprise another 70,405 miles, of which 57,601 are hard-surfaced. More than 2000 motor buses, with a seating capacity of over 62,000 persons, ply the Ohio roadways daily. Ohio, the birthplace of aviation, stands among the leaders in this new form of transportation

Columbus, the capital of the state, is not only its center but is also the hub of 75% of the industrial activity of the nation One-half of the population of the United States of America lives within 500 miles of Columbus.

To serve its people, Ohio has built a closely knit network of 8,482 miles of railroad Being bounded on the north by Lake Erie and on the south and east by the Ohio River, Ohio shares in these two great inland water-ways Thus, Ohio is favored geographically with natural facilities for low cost carriage of bulky commodities The commerce of the Great Lakes system of transportation consists chiefly in the movement of coal and ore, stone and grain while the Ohio system carries coal and

TABLE I

WIND-POLLINATED PLANTS OF OHIO

Trees

PINE FAMILY, 4 native and 4 introduced species
White Pine—73*
Pinus strobus L
JUNIPER FAMILY, 4 native and 1 introduced species
Common Juniper—78
Juniperus commune L.
MAPLE FAMILY, 8 native and 4 introduced species
Sugar Maple—1382
Acer saccharum Marsh
Silver Maple—1386
Acer saccharinum L
Box Elder—1387
Acer negundo L
PLANE FAMILY, 1 native and 2 introduced species
Sycamore—1397
Platanus occidentalis L
ELM FAMILY, 5 native and 2 introduced species
White Elm—1398
Ulmus americana L
Slippery Elm—1400
Ulmus fulva Mx
Common Hackberry—1401
Celtis occidentalis L
MULBERRY FAMILY, several species
Paper Mulberry
Broussonetia papyrifera Vent

BEECH FAMILY, including Beech and Oak, 17 species and subspecies
American Beech—1417
Fagus grandifolia Ehrh
White Oak—1423
Quercus alba L
Red Oak—1432
Quercus rubra L
BIRCH FAMILY, including Hazelnut, Ironwood, Alder and several species of birch
Hop Hornbeam—1435
Ostrya virginiana (Mill) Willd
Hoary Alder—1442
Alnus incana L Willd
WALNUT FAMILY, including Hickory, 7 species, also Walnut and Butternut
Shagbark Hickory—1450
Carya ovata
Black Walnut—1452
Juglans nigra L
WILLOW FAMILY, including Aspen, Poplar, 6 species, and Willow, 28 species, subspecies and hybrids
Cottonwood—1461
Populus deltoides Marsh
Black Willow—1465
Salix nigra Marsh
OLIVE FAMILY, including only the Ash genus, 6 native and 1 introduced species
White Ash—1620
Fraxinus americana L

Grasses

GRASS FAMILY, including 200 native and introduced species
Tall Fescue—338
Festuca elatior L
Canada Bluegrass—354
Poa compressa L
Annual Bluegrass—356
Poa annua L.
Kentucky Bluegrass—362
Poa pratensis L

Orchard Grass—365
Dactylis glomerata L
Redtop—404
Agrostis alba L
Timothy—415
Phleum pratense L
Rye—443
Secale cereale L
Indian Corn—524
Zea mays

will never get a chance to pollinate. It will be too closely grazed or too frequently cut for silage to be allowed ever to bloom English plantain sheds its pollen in waste places and on lawns mostly during June and July, with insignificant amounts during August and September. Goosefoots and amaranths shed pollen in late summer and fall but in such small

TABLE II
RAGWEED POLLEN

Year	*Highest Daily Count*	*Date of Highest Count*	*Total*
1947	529	Sept 4	4035
1948	472	Aug. 29	5383
1949	457	Sept. 2	6399
1950	504	Aug 28	5004
1951	284	Aug. 30	4882
1952	616	Sept 3	6354

Cleveland Health Museum
8911 Euclid Avenue
Cleveland 6, Ohio

amounts as to be seldom, if ever, specific sources of inhalant allergy

By far the most abundant of all pollens in this region is that of the ragweeds which begin to bloom about the first of August, increasing rapidly in abundance after the tenth of August until about the first of September, then gradually diminishing until the end of the month Consequently, the person who says his ragweed hay fever lasts until the first heavy frost, October 10 to 20, is most likely affected by spores of various fungi which are often abundant in October.

Time was, not so long ago, most of Ohio's heavily eroded farms in the non-glaciated part of this region were full of ragweeds It seems that Nature likes most of our hay fever producing weeds to use in the restoration of eroded and despoiled topsoil They bring more of the essential mineral nutrients which have been washed away, soaked out of the soil or sold

coke, sand, gravel, gasoline, iron and steel, steel pipe, railroad ties, lumber and sulphuric acid.

Pollens. With climate suitable for diversified agriculture it is to be expected that eastern Ohio will be a place suitable for a wide variety of vegetation, and so it is. But of the thousands of species and varieties of plants found in this region, comparatively few meet the requirements of an active allergen. In order to be effective as a sensitizer of the mucous membranes of the nose, throat and bronchial tree, a pollen must be light enough to be wind borne, abundant enough to constitute an inhalant hazard and must have the right chemical composition to be a sensitizer (allergen).

In Table I, I have listed all of the Ohio plants capable of furnishing air-borne pollen in appreciable quantities. Under each family are listed at least one typical species or several of the more common ones. It should be noted that a single tree of any of the many species of the several tree families listed may, because of its close proximity to the home, play a definite role in occasional cases. Even the tree of heaven *(Ailanthus)*, although essentially insect pollinated, is sometimes a cause of nasal symptoms. I suggest therefore that in addition to making careful inquiry into the patient's time of symptoms and his environment, it is advisable to test with pollen of one or more typical species of all families in the list.

Most of the trees of eastern Ohio shed their pollen in April and May, but during early spring seasons alders, elms and maples may begin in March, particularly in the southern part. The outstanding producers in Cleveland, named in order of their productivity, are sycamore, poplar, oak, elm, box elder and hickory. A small amount of grass pollen appears during May, but the heaviest production occurs during June and early July. Small amounts may be encountered locally in August and September.

It should be noted that the trend toward grassland farming is in itself going to be an additional factor in the production of "rose colds," as this allergic response in the nose to grass pollen is usually called. The growing grass for the most part

duction of an area in general, I have included the pollen count for the last five years as made by the Cleveland Health Museum in Table II and the highest counts for ragweed pollen in Columbus, Ohio, as made by the City Health Department Laboratories in Table III.

Spores of Fungi. The fact is there are so many species and varieties of fungi even in this semi-humid area that they have not been worked well, especially from the viewpoint of the allergic person Result is that persons who have symptoms of hay fever during the "growing season" which do not correspond with the season of pollination of the trees, the grasses, or the weeds are likely to be allergic to the spores of some one of the fungi As a general practice I can say, from a survey of allergists which I conducted in 1952, this usually consists here in Eastern Ohio of skin tests with extracts of the spores of *Alternaria* and *Hormodendrum* and treatment with the appropriate extracts It must not be forgotten, however, that, in some persons who have their trouble between the grass season and the weed season, sensitization to the pollens of lamb's quarters or to English plantain may be the cause.

Eastern Ohio as a Place to Live. Ohio, since its early settlement, has been at the crossroads of the Nation Consequently, it has been the birthplace of several religious groups and the home of many reform movements in all walks of life. It has welcomed into its friendly atmosphere people from all other states and nations The result is that the State is rich in its cultural facilities and traditions The State of Ohio has more colleges and universities than any other State in the Union or even than in the whole of the British Empire Twenty-eight of these universities and colleges are in Eastern Ohio The religious and library facilities are everywhere equal to the educational Many more families of moderate means can therefore arrange to avail themselves of higher education for their children than would be possible elsewhere

The Ohio Development and Publicity Commission of Columbus will be glad to give information in detail as to the size, location, denominational affiliation, and tuition of the various

in foods to the city folks to send to the sea in the sewers. Once the fertility is restored, the grasses will crowd out the weeds. Consequently, the proper approach to weed eradication is the application of the principles of soil and water conservation and not spraying poison weed killers. In the depression days of the 1930's most of the towns and cities in this region got caught with the remnants of the recent real estate boom. Thousands of city lots in the outskirts were left unsold, unoccupied and grew promptly up to weeds, of which the ragweeds were among the most abundant These wounds have now been healed. The upsurge of the population and the migration to the cities have changed all that. These areas have all been built up with new homes, closely cropped lawns and no pollen production whatsoever.

TABLE III

DAILY RAGWEED POLLEN COUNTS IN COLUMBUS

From August 15 through September 15
For the years 1938 through 1952

Year	*Highest count*
1948	309
1949	890
1950	670
1951	376
1952	737

The perimeter of our Ohio towns is now taken up with homesteads. Lovers of the land now have from three to 15 acres on which they have well-kept lawns and clean-row gardens (some 500,000 acres of some of Ohio's best farm land has so been taken out of agricultural production) So we can say that changing economic conditions have cut down sharply on the production of ragweed pollen in eastern Ohio but in nowhere near the amount that the sufferer from ragweed hay-fever would like to see

Because ragweed pollen is the major concern of most people and because incidence is a good index to the pollen pro-

8

Maryland

By WALTER L. WINKENWERDER, M.D.

THE STATE of Maryland, though one of the smaller States of the Union, spreads over a comparatively wide area presenting three distinct physiographic areas. It extends westward from the Atlantic Ocean over the low-lying coastal plain to the Chesapeake Bay, thence across a rolling plateau to the Appalachian Mountains, which attain an altitude of 3,000 feet or more The distance from the ocean to the western mountainous border is approximately 350 miles, the total land mass of the State is about 10,000 square miles. The coastal plain and adjacent rolling plateau is divided into, roughly, equal parts by the Chesapeake Bay

Geography. The coastal plain, an area of approximately 5,000 square miles, is divided into an eastern and western section by the Chesapeake Bay The former, familiarly known as the Eastern Shore, is relatively flat and extends eastward from the Bay to the Delaware line and the Atlantic Ocean The western section, slightly rolling and slightly higher in elevation, extends westward to a line connecting Elkton, Baltimore and Washington and thence southward to the Potomac River Both the eastern and western sections of the coastal plain are traversed by several wide rivers which empty into the Chesapeake Bay, whose shore line is much indented and irregular, forming many estuaries and small bays The Eastern Shore area is dotted with many small villages and cities, most of which are located on the shores of the several rivers. This area is primarily agricultural in character with fishing, crabbing and oystering as the chief industry of the population along the shore of the Bay and rivers Dairy production and beef cattle are more important in the northern section, but extensive truck

schools of higher learning as well as a listing of the denominational location of the churches in each county. Because Eastern Ohio is typically American in all things, it provides an excellent opportunity for the pursuit of health and happiness to the average American and his family.

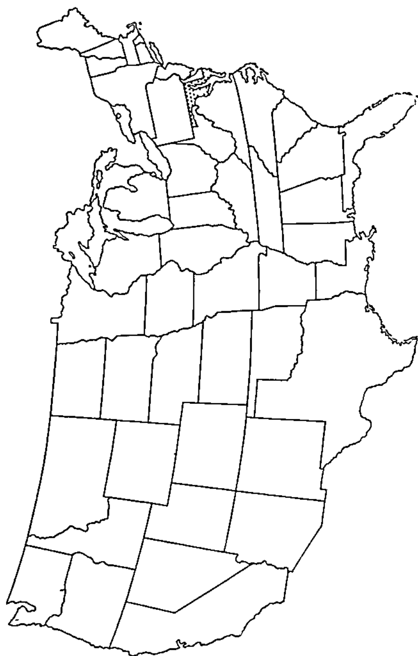
SUMMARY

Eastern Ohio marks the eastern boundary of the "bread basket of the world" and has therefore an abundance of grass and weed pollens. It also marks the western limits of the hardwood area in the foothills of the Appalachian Mountains Consequently, there are plenty of trees with pollens which are potential allergens. There is abundance of the fungi alternaria and hormodendrum infecting our grasses and grains.

The climate is not to be considered a factor In consequence, Ohio offers a favorable place to work and live to all allergics The only patients whom the allergist is sometimes called upon to send to more equitable climates are the aged, especially those with a definitely infected bronchial tree and allergy to the invading germs. The allergic person can well consider coming to this area with its schools, colleges, and centers of culture making it a desirable place in which to live. With several allergists in Cleveland, Akron, Canton, Mansfield, Warren, Youngstown, Steubenville, Columbus and Portsmouth and an army of alert and up-to-date personal physicians, he can be sure of the proper care and management to insure that he gets and keeps his allergies under control.

farming, the related canning industry, and the raising of poultry, particularly, for the production of broilers, has obtained the status of major industries in the central and southern sections Situated less than a half-day's truck drive from the great population centers of the East, namely, New York City, Philadelphia, Baltimore, and Washington, produce from the farms are quickly transported to these areas. That part of the western half of the coastal plain, east and north of the City of Baltimore, is a highly industrial area, chief of which is the mammoth Bethlehem Steel Works, the Sparrows Point Division, which lies on the north shore of the Patapsco River about 10 miles east of the City of Baltimore North lies the important Martin Aircraft Plant, and further north the United States Aberdeen Proving Grounds and the United States Army Chemical Center The City of Baltimore, one of the important seaports of the country, with a population of, approximately, one million people, is situated on the shores of the Patapsco River about 10 miles west of the Bay The districts (counties) immediately surrounding Baltimore on the north, west and south are suburban in character and contain roughly a population of 400,000 South of the line connecting Baltimore and Washington is the major part of the western section of the coastal plain which extends south to the shores of the Potomac River; this is commonly known as Southern Maryland and it is more rolling and slightly higher than the Eastern Shore, but more sparcely populated Since early colonial days, tobacco has been the chief product of this area, which eventually depleted much of the soil In recent years truck farming on an extensive scale has developed, particularly, in the upper counties which are situated close to Baltimore and Washington. Employing soil conservation methods including crop rotation, the soil is being reclaimed and general farming and beef and dairy production is increasing

The central plateau, a part of the Piedmont Plateau, which extends from New Jersey and Pennsylvania through Maryland southward, borders on the coastal plain in the east and extends westward to the Blue Ridge Mountains Baltimore and Wash-



in the United States. Cumberland, a city of 37,679, second only to Baltimore in industrial development is the civic center of this area

Climate. Except for the western mountainous area, the climate of Maryland is mild and less rigorous, and more changeable in all seasons than to the north and less warm, and humid and enervating than that of the southland. It is modified by the Chesapeake Bay (which bisects the State) the Atlantic Ocean to the east, and the Blue Ridge and Appalachian Mountains to the west Baltimore is near the average path of low-pressure areas which move across the country, hence changes in wind directions are frequent and are the cause of the changeable character of the weather The over-all effect however of the mountains to the west, and the Bay and the Ocean to the east, is to produce a more equable climate In the process of moving over the mountains, cold polar air during the winter months, is warmed somewhat before reaching the greater part of Maryland east of the Appalachian range. Conversely, during the summer months, air moving into the coastal areas is somewhat cooler than the air from continental sources to the south and southwest, and because of the higher elevation of northern and western Maryland the climate likewise is comparatively cool In general, the coastal areas are comparatively warm and humid in summer and the winters mild with little snow and ice Smog to the extent of aggravating allergic conditions may develop during a low pressure phase when wind currents are minimal but fortunately this is a rare occurrence. Smoke control in Baltimore has been instituted in recent years and with considerable success

Although marked changes in temperature and humidity may occur during any season of the year, the extreme temperatures in the interior areas in the United States are uncommon. Temperatures in the Baltimore area over 100° occur on the average only twice in three years, while temperatures below zero occur once in seven years The highest temperature record in Baltimore was 107° on July 10, 1936, and the lowest minus 7° on February 9, 1934 and February 10, 1899 The Months of June

ington lie at the southern extremity. It contains about 2,500 square miles, or a little more than one-quarter of the total area of the State. The elevation in the western part of this area becomes higher, reaching approximately 500 to 1,000 feet. The terrain is broken and hilly with intervening valleys, containing rich limestone soil and represents a rich agricultural section devoted to general farming, dairy and beef cattle, and many horse-breeding farms, the latter particularly, to the north and northwest of the City of Baltimore. Though less important, this area also contains large quantities of fine building stone, limestone and potting materials. Maryland granite and marble has been used in the construction of many of the national buildings in Washington. Frederick, a city of approximately 18,142 (1950 U.S. Census) situated about 50 miles northwest of the City of Baltimore is the largest city on the western fringe of this area.

The highlands of Maryland, a part of the Appalachian Highland, is a mountainous section with valleys and plateaus which form the divide between the streams that flow eastward to the Chesapeake Bay and those which flow westward toward the interior of the country. This region, familiarly known as Western Maryland, gradually narrows as the State projects westward, pointing like a finger between the Potomac River on the south, and the Pennsylvania line on the north. It contains about 2,000 square miles. At one point the width of the State in the region of Hancock is about three miles wide, and at the extreme western border, the north-south distance, is 40 miles The Maryland Highland has three natural divisions, the Blue Ridge division in the eastern part, the Appalachian Mountains in the central part and the Alleghany Plateau in the extreme western part. Many of the mountain ranges are over 2,000 feet high and in the latter area some exceed 3,000 feet Soft coal mining is the chief industry of the western section The mining of "cement rock," fire-clay, and quarrying of limestone are of lesser importance Because of the terrain agricultural production has given way to large orchards, especially apples, and this area ranks with any area of comparable size

in the United States Cumberland, a city of 37,679, second only to Baltimore in industrial development is the civic center of this area

Climate. Except for the western mountainous area, the climate of Maryland is mild and less rigorous, and more changeable in all seasons than to the north and less warm, and humid and enervating than that of the southland. It is modified by the Chesapeake Bay (which bisects the State) the Atlantic Ocean to the east, and the Blue Ridge and Appalachian Mountains to the west Baltimore is near the average path of low-pressure areas which move across the country, hence changes in wind directions are frequent and are the cause of the changeable character of the weather. The over-all effect however of the mountains to the west, and the Bay and the Ocean to the east, is to produce a more equable climate. In the process of moving over the mountains, cold polar air during the winter months, is warmed somewhat before reaching the greater part of Maryland east of the Appalachian range Conversely, during the summer months, air moving into the coastal areas is somewhat cooler than the air from continental sources to the south and southwest, and because of the higher elevation of northern and western Maryland the climate likewise is comparatively cool In general, the coastal areas are comparatively warm and humid in summer and the winters mild with little snow and ice Smog to the extent of aggravating allergic conditions may develop during a low pressure phase when wind currents are minimal but fortunately this is a rare occurrence. Smoke control in Baltimore has been instituted in recent years and with considerable success.

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through September are the warmest, the temperatures averaging 73° (1948 records). While hot, humid, muggy periods of weather are not uncommon during the warmer months breezes from the Ocean and the Bay, and afternoon and evening thunder showers bring some measure of relief. October and November are relatively mild with many warm days interspersed throughout this period. The temperature averages 54°. The winter months—December through February—average 35.9°, with January the coldest, presenting an average of 29 3°. As in summer the winter temperatures may vary greatly and many warm days, some attaining temperatures of 60° or even 70° may occur. Rain and sleet storms are not uncommon during the winter months but the snow fall during recent winters has been exceedingly infrequent and scant, except in the western, mountainous areas. Highway facilities are optimum except for infrequent icy conditions associated with sleet and snow storms. Because of the mild springs and falls the growing season is relatively long, approximately, 207 days, and adequate for the normal development of varied agricultural crops, fruits, berries and vegetables. Pasturage is usable for dairy and beef cattle from early spring into the winter months of the year. The average date of the last killing frost in the spring is April 7 and the first killing frost in the late autumn in late October or even early in November.

The rainfall throughout the year is rather uniform. All months except November usually have an average of three inches or more. The total precipitation for 1951 was 42 77 inches. Severe droughts during the summer and fall months are relatively uncommon. Rainfall during the summer comes principally in the form of thunder showers and, therefore, varies considerably, depending upon the number of such storms in any given locality High winds or hail associated with such storms cause some damage but this is relatively infrequent. In the Baltimore area an average of 32 thunder storms occur each year. Since three-quarters of Maryland lies east of the Appalachian and Blue Ridge Mountains, in or adjacent to the Chesapeake Bay basin, wind storms of hurricane propor-

tions are retarded and rarely attain the intensity or destructive force that they do in the interior of the country.

Population Characteristics, Housing, Schools. According to 1950 U S. Census Reports, the population of Maryland was 2,343,001, of which 1,615,902 resided in urban areas, 543,623 in rural areas not engaged in farming, and 183,476 actually on farms. Approximately 72% of the total population of the State reside in the standard metropolitan areas of Baltimore and Washington: 1,337,373 in the former which includes Baltimore County to the north, west and east–(270,273), and Anne Arundel County on the South–(117,392). The two counties bordering on the district of Columbia contain 359,583 inhabitants Exclusive of Baltimore there are 33 urban places in the state containing 2500 or more inhabitants of which 10 exceed 10,000.

The total population of the State includes 385,972 negroes and 84,440 foreign born The latter represents varying numbers principally from England, Ireland, Scotland, Germany, Poland, the Balkan States, Russia, Greece and Italy, of which the great majority reside in urban areas Since early colonial days, Maryland has been predominantly English in ancestry and cultural heritage, however, other nationalities as mentioned have formed substantial cultural groups, especially, in the City of Baltimore and have contributed much to the social, industrial and cultural development of the City and State.

Housing facilities in the State have kept pace with the increasing demands especially in and adjacent to the City of Baltimore As in other growing industrial areas, demands for additional housing facilities started just prior to World War II, and have continued during and since the war. Extensive private construction especially in the suburbs has been tremendous In the City of Baltimore the reconstruction of blighted slum areas sponsored by the civic authorities through the Baltimore Housing Authority is especially noteworthy and has gained nation-wide recognition.

Educational facilities in the State consisting of public and parochial schools, and privately endowed institutions are of

high standard. The increasing growth of population in the metropolitan areas of Baltimore and Washington during the last decade has incurred some crowding but extensive new construction of schools has in general met the demands.

Important Allergies. The pollen seasons in the State of Maryland present the characteristics common to the Eastern seaboard with minor variations in pollination depending on seasonal conditions.

The tree season begins in early March with the pollination of maples, followed by the poplars and willows in the latter part of the month; however, the amount of pollination is usually insufficient to induce symptoms of hay fever or asthma until the middle or latter part of April when pine pollen may reach a peak and is supplemented by sycamore, walnut, oak, beech and hickory pollen of which oak is the more profuse and, therefore, the more important Clinical experience indicates that it is difficult to correlate symptoms during the tree season with the varying species of pollen except in the case of oak. In general hay fever and asthma during the tree season is usually mild compared to the grass and ragweed seasons.

The grass season begins early in May, reaches its height toward the end of May and the first part of June and then gradually tapers off and ends usually in early July although pollen in small numbers may be present in the air throughout this month. Sweet vernal and orchard grass pollen appears in early May and continue to late June. Timothy grass pollinates in early or mid June and is the significant pollen clinically during the remainder of the grass season. English plaintain pollinates coincidently with sweet vernal and orchard grass in early May and continues to middle of July Most grass hay fever patients react to plaintain on skin testing and this pollen is routinely included in grass extract mixtures for desensitization.

Ragweed begins pollinating during the second week of August, gradually increases and reaches its peak during the last few days of August and the first two weeks of September Pollen counts average from 30 to 350, rarely reach 500 during

the height of the season, and then taper off rapidly during the latter half of September but may be found in small numbers in October depending on climatic conditions. Studies in 1949 by Sherman and Gay revealed that ragweed pollen counts were actually lower in the City of Baltimore than in areas to the south and north, and even to the west in the City of

Fig 1 Pollination periods of seasonal allergens in Maryland.

Frederick which lies at the foothills of the Blue Ridge Mountains. Though actual pollen counts have not been made in the extreme western region, namely in the Appalachian Mountains, ragweed pollen counts must be very low as many patients report relief of symptoms and look upon the area as a newly discovered haven for hay fever suffers. Pollen hay fever and asthma produced by ragweed sensitivity is relatively more severe than that produced by tree and grass pollen, but is probably not as severe as that experienced in the interior areas of the country where pollen counts are usually higher

Adequate mold studies have not been made in Maryland. Reports by Patterson and Gay for 1930 season show that spores appeared on exposed slides in early June and continued to appear throughout the summer until the end of September. *Cladosporium* and *Alternaria* were predominant with higher

counts during August and September. Other types identified were *Mucor, Rhizopus, Penicillium* and *Aspergillus* but were few in number and further studies are necessary before clinical significance can be attributed to these species. Skin testing to common molds indicates that roughly 50% of hay fever patients give significant reactions and additional improvement in symptom control sometimes obtains when spore therapy is added to pollen extract desensitization. The maximum potential and even relative importance however of molds in the causation of hay fever and asthma is unknown. In the writer's experience only two patients, one with chronic rhinitis, and the other with seasonal asthma from early June to late September, have been studied in which mold sensitivity appeared to be the sole cause. The former reacted on skin testing only to spore extract, and the latter was skin negative to all antigens except molds. Inhalation of spore extract under controlled conditions readily and repeatedly elicited asthmatic symptoms.

Important Allergies Other Than Pollen. Dust of various sources is the important cause of perennial hay fever and asthma. Except for dusts encountered in certain occupations, symptoms begin in the fall about the middle of September before the end of the ragweed season when the cool evenings and nights make it necessary to keep windows and doors closed and furnaces are turned on As in other areas dust from certain homes may be so unique that desensitization to specific extracts is necessary to attain successful results Hypersensitivity to dust and other environmental antigens frequently coexists with infection of the respiratory tract, to produce the perennial form of "hay fever"; this is true particularly, in children, and successful treatment is usually more difficult than in seasonal pollen allergy It is possible that the highly changeable damp climate during the cold months of the year is an important factor favoring the development of infection.

Allergy to pets such as dogs and cats does not differ essentially from other communities, but horse dander sensitivity is important. Maryland has been and is a great horse state, and supports many breeding farms, and, in addition, to formal rac-

ing at pari-mutual tracks, riding for pleasure is a major recreation Desensitization is frequently requested permitting children to keep their ponies and to permit the fox hunter his sport, and in most instances such treatment is successful. Though tobacco is raised rather extensively in Southern Maryland and contact with tobacco dust in drying sheds and at the markets is frequent, instances of respiratory allergy to such dust is relatively rare.

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9

South Atlantic States

By Wyndham B. Blanton, M.D.

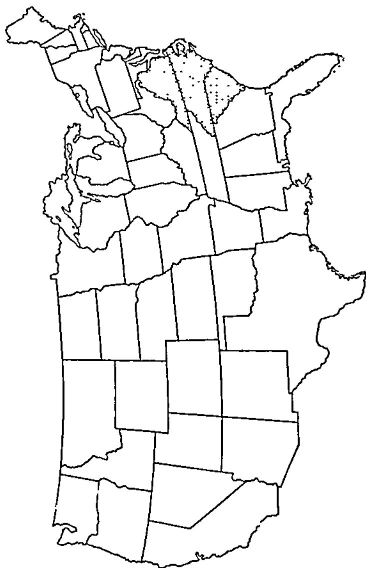
GEOGRAPHY. The Atlantic Seaboard, south of Baltimore, lying between 39° 37′ and 30° 31′ 39″, N. Latitude, and 75° 37′ and 85° 53′ 38″ W. Longitude, embraces the District of Columbia and the States of Virginia, North Carolina, South Carolina, and Georgia (which is covered in a separate chapter). The area is bounded on the north by Maryland, on the east by the Atlantic Ocean, on the south by Florida, and on the west by Alabama, Tennessee, Kentucky and West Virginia. It measures roughly 700 miles in length obliquely from north to south, and about 300 miles in width. It contains 185,299 square miles. From east to west it falls into three natural subdivisions:

(1) The Coastal Plain stretches along the whole eastern boundary of the area and reaches to the falls of the rivers. It varies in width from 50 to 150 miles. The land is flat and crossed from west to east by at least a dozen large rivers Numerous bays, sounds, lagoons, and estuaries mark the sandy coast line where extensive salt water swamps occur, the largest of which, Dismal Swamp, contains 700 square miles. Many fertile subtropical islands skirt the southern coast, especially that of Georgia

(2) The Piedmont Plateau extends from the "Fall Line" of the rivers to the mountain escarpment, varying in width—in Virginia from 40 to 175 miles It has an elevation of from 150 to 1,000 feet.

(3) The Mountain Belt consists of the Blue Ridge, extending to Northeast Georgia, and the Allegheny Ridges, highest in North Carolina, where Mt Mitchell towers 6,711 feet, with the Great Valley between them, 25 to 30 miles wide in Virginia

Climate. The climate over this whole area is determined by



the latitude, the proximity of the Gulf, the Atlantic Ocean, the elevation and the prevailing winds. The Coastal Plain, tempered by the Atlantic Ocean, tends to be more humid, freer from frost, with a longer growing season and a higher average temperature. The Piedmont Area has less rainfall. Being higher it is a little cooler, although it does not enjoy sea breezes, and tends to have a continental temperature determined by the prevailing winds which are westerly. The mountainous areas by virtue of their elevation, are cooler, have more rain, more frost and a shorter growing season.

As we go south in this area we find that the average temperature rises The Virginia average for January is 39°; for July 74°. The Georgia average for January is 46°; for July 78°.

The first frost appears in the mountainous areas of all these States early in October. On the sea coast it may not appear until December In general the growing season, a fact that has considerable bearing upon the pollination of all plants, lengthens as we go from mountains to sea coast, and as we go from north to south. The average growing season in Virginia is 193 days. In Georgia it is 294 days.

Rainfall influences pollen production and its air dissemination. The annual precipitation over this area increases as we go south. The average for Virginia is 42 inches For South Carolina and Georgia, 45 inches Over the whole area the greatest precipitation occurs in the mountains and on the Coastal Plain

Sunshine also increases as we go south. Virginia has 60% of possible sunshine, North Carolina, 61%; South Carolina, 64%. Humidity is highest in the winter months. Fall is the dry season of the year. October is driest in Virginia, November in Georgia

Over most of this area the prevailing winds are from the southwest. Average wind velocity in Virginia varies from 4 8 miles per hour at Lynchburg, to 13 9 miles per hour at Cape Henry The average for South Carolina is nine miles per hour.

It is generally agreed that weather influences allergic manifestations, especially in the case of asthma. Much has been

made of the influence of weather and climate upon man in health and disease by William F. Peterson (*The Patient and the Weather*) and by Clarence A. Mills (*Climate Makes the Man*). Without going to the extremes of either of these writers, allergists throughout this area when questioned* generally felt that sudden changes in temperature, dampness, wind and humidity are important factors in exciting allergic symptoms. Whereas there are great variations in climate from the semi-tropical weather of South Georgia and the Carolina coast, to the not infrequently snow-covered peaks of the Blue Ridge and Allegheny Mountains, on the whole it may be said very few parts of the United States offer a better climate. There is just enough variation between the extremes of winter and summer to be stimulating There is the tempering effect of the Atlantic Ocean, the protecting barrier of the western mountain ranges, and freedom from storm centers that frequently disturb other portions of the country and there are the refreshing "westerlies" in the heat of summer

Population. About 14,000,000 people live in this area. About 9,000,000 of them are native whites, 5,000,000 are negroes, with a scattering of other races. Seventy-five per cent of the people of Virginia are white, 60% of the people of South Carolina Generally the area is rural Sixty-five per cent of the people live in the country, but the trend is increasingly towards the cities and industrial employment. In an extensive survey made in Richmond, Virginia, in 1949 among normal people above 15 years of age, the incidence of major allergies among the white race was nearly twice that among negroes

Incidence. The incidence of major allergies in this area is reflected in a multiple screening survey, conducted in Richmond, Virginia, in 1949-1950 when 37,609 individuals, white and colored, male and female, 15 years and over were screened for 10 chronic diseases, three of which were allergic. The total number of persons stating that they had asthma, seasonal hay

* Fifteen allergists of this area answered a questionnaire on regional allergy in this area

fever, or perennial hay fever, was 2,573, or 6.8% of the whole. There were 989 cases of asthma, 2.6%; 1,138 cases of seasonal hay fever, 3%; and there were 446 cases of perennial hay fever, 1.2%. Four chronic diseases, rheumatic fever, diabetes, tuberculosis and heart disease amounted to 2,108. In other words, the allergic diseases outnumbered all of these four chronic diseases combined.

Pollen. The pollination season in this area is determined by climate and soil, and varies roughly with latitude, longitude and altitude. The difference in latitude is 7°, in longitude 10°. The mountains have an average altitude of from 1,500 to 3,500 feet. It has been stated that in general the time of pollination is four days late for each degree of latitude, five degrees of longitude or 400 feet of altitude, northeast and upward. (P. M. Gottlieb and E. Urbach, Jr.: *Lab. & Clin. Med.*, 28:1053, 1943.) If this be true, we are prepared to expect about one month's difference in pollination time between the extreme north and south boundaries of the area. This rule is approximated in the case of trees.

Trees. The tree season begins in Georgia in the middle of January and continues to the middle of May. In Baltimore the tree season begins the first of March and terminates in the middle of May. Throughout the area the trees of greatest clinical significance are oak, elm, maple, hickory, sycamore and ash. In Georgia and the Carolinas pecan is a frequent offender. Trees of less importance are sweet gum, red cedar, alder, mulberry, hackberry, poplar and willow. Wax myrtle (*Myrica cerifera*), a shrub or small tree of the coastal plain, is an abundant pollen producer of early spring. The pollen grains resemble those of birch. The toxic qualities of this pollen have received little or no attention The concentration of tree pollen in the air may become very high, sometimes reaching 700 per square centimeter.

Grasses. The season in the South Atlantic States begins in Georgia about the first of May and continues well into September. In South Carolina it extends from the middle of May to the middle of August, in North Carolina from March to

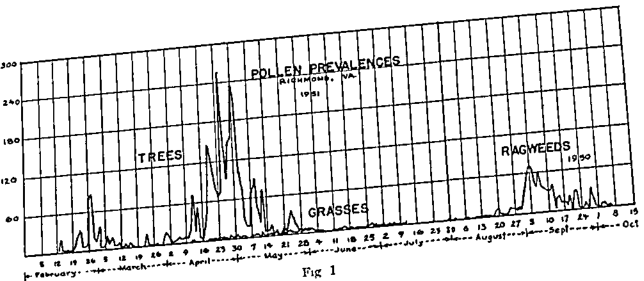

POLLEN PREVALENCES
RICHMOND, VA.
1951
TREES
GRASSES
RAGWEEDS
1950
300
240
180
120
60
5 12 19 26 5 12 19 26 2 9 16 23 30 7 14 21 28 4 11 18 25 2 9 16 23 30 6 13 20 27 3 10 17 24 1 8 15
February
March
April
May
June
July
August
Sept
Oct

Fig 1

mid July; in Virginia from the first of May to the middle of July. The same pattern is followed as far north as Baltimore. The grasses of clinical significance in this area are Bermuda, blue grass, redtop, Johnson, orchard, and sweet vernal Timothy is not of significance south of Virginia. Bermuda is not of significance north of Virginia. In Baltimore, orchard grass is the greatest source of grass pollen. This is probably true of much of the rest of the area also. In Virginia there is an overlapping of all the above varieties. Blue grass, pollinating from late May to early June does not flourish below the Carolinas. Being a lawn grass, it is clipped before pollination.

Ragweeds. Although both dwarf and giant ragweed flourish in all these states, dwarf ragweed is much more abundant and important. Ragweed prefers a hot dry climate. The South Atlantic seaboard with its vegetation inclining toward forest growth and its frequent uniform rains accounts for the fact that there is much less ragweed here than on the western prairies. The average ragweed index for Virginia is 35, for North Carolina 44, and for Georgia 30. This should be compared with a figure of 100 or more in a number of places in the Mississippi and Ohio Valleys. Counts in this area rarely exceed 150 per square centimeter. The season begins in Baltimore about August 8, and ends about October 7, with a peak count toward the last of August This represents a season of about two months and the pattern is closely followed in Washington, D C, and Richmond, Virginia Ragweed pollen is encountered in Charlotte, North Carolina, as early as July, further south still earlier. The ragweeds are the dominant weed of this area. Cocklebur plants are also abundant, but their production of pollen is extremely small compared with the other ragweeds Plantain is considered by some allergists in the area to be an important offender Others regard it as negligible. The low aerial incidence of its pollen throughout the area and its comparatively low-grade toxicity would seem to assign it a minor role

The area is predominantly agricultural. The important crops are cotton and tobacco, the cereals (wheat, oats, rye, and

corn), peanuts, hay, apples and peaches. Lumber and the fisheries engage the attention of many persons. Dairying is increasingly important. The manufactures of importance are cigarettes, textiles, furniture, fertilizer, paper from pulp wood and rayon.

The geographical incidence of *air-borne mold spores* is low in the eastern states and minimal in the south. *Alternaria* and *Hormodendrum* constitute about 25% of the total. Counts made from May to October, 1949, showed totals of *Alternaria* in Richmond, Virginia, of 1,277; in Charlotte, North Carolina, 390, in Savannah, Georgia, 504, of *Hormodendrum*, in Richmond, Va., 435, in Charlotte, N. C., 692, in Savannah, Ga., 376 There was an apparent unpredictable seasonal variation in the incidence of *Alternaria*. *Hormodendrum* counts appeared to increase with the advance of the season. Counts made by Dr L. C Todd in Charlotte, N C., for the whole of 1949 showed other spores but none in significant numbers. They included *Torula*, *Monilia*, *Penicillium*, *Helminthosporium*, *Aspergillus*, *Rhizopus*, and *Mucor* There were no striking seasonal fluctuations (*J Allergy*, 21·455, 1950)

Among the 15 allergists in this area questioned with reference to the importance of molds, five thought them of little importance, four thought them very important. Apparently local personal contact is important. There are no *spore clouds* such as occur in the west

The occupations and industries of the South Atlantic States are of minimal allergic significance Although much of the tobacco of the nation is grown here, sensitization among workers appears to be rare When it occurs it may be due to the leaf itself, or to the paste or chemicals used in curing it Nasal and bronchial asthma among tobacco users is not peculiar to the area Cotton is grown extensively in the three most southern states in the group The cotton gins and mills, as well as its processing into the many articles to which it is put, offer some, though not important industrial hazards. The furniture industry of this area has some significance where wood dust, poisonous woods, polishes and lacquers may induce sensitization.

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Kentucky

By Maurice Kaufmann, M.D.

GEOGRAPHY. The State of Kentucky, with an area of slightly over 40,000 square miles, lies within 36° 30′ to 39° 15′ North Latitude and 82° to 89° 30′ West Longitude. Its surface rises unevenly eastward, as a diversified tableland, from bluffs near the Mississippi and lower Ohio Rivers to the mountains that form the eastern and southeastern part of the State. With the exception of a few southeastern counties, the general slope of this tableland is toward the northwest, with elevations ranging from about 400 feet above sea level at the western edge to 1,000 feet in the central districts and 2,800 feet at the summit of Pine Mountain Ridge near the southeastern border

The mountains are long, sharp-crested ranges, extending in a northeast-southwest direction, separated by narrow valleys Some ranges are almost unbroken while others are deeply cut by streams A belt of peculiar country called the Knobs, made up largely of conical sandstone hills, parallels the mountains nearly to the southern border of the State and thence turns northwestward to the Ohio River, forming a semicircle that encloses the famous bluegrass area The latter is a gently undulating plateau, noted for its beauty, fertility, excellent grass, stock farms, and white burley tobacco South of the Knobs lies the deeply dissected and very irregular area of the upper Cumberland drainage system, which slopes toward the southwest

Named in order from west to east, the principal Rivers are the Tennessee, Cumberland, Green, Salt, Kentucky, Licking, and Big Sandy The Green River has cut a deep valley across a thick limestone formation in which are many caverns, includ-

This has been reported in North Carolina. Chicken and turkey factories in the area, due to a heavy concentration of dander in the air, may be a source of trouble. Allergy of this type has been noted in Georgia. Large scale dusting of farm lands with sensitizing chemicals as practiced in some of these states, especially those growing cotton (North Carolina) must be reckoned with. The paper manufacturing industry has been cited as offering an occasional allergic hazard.

No particular insect allergy seems to be characteristic of the area, nor are there any foods peculiar to it of allergic significance.

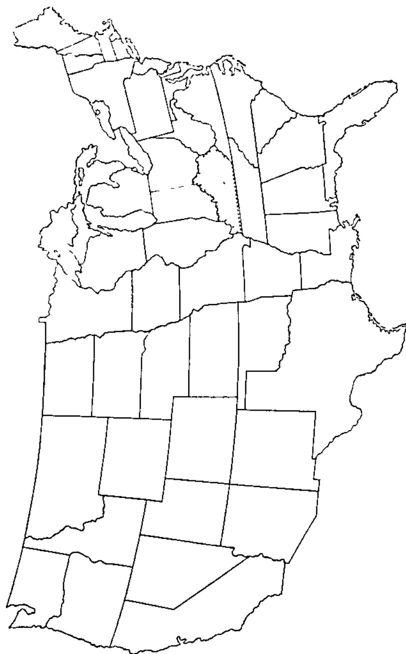
It is not believed that the incidence of contact dermatitis is greater here than in other areas of the United States, or that there are any contactants peculiar to the area. The allergists of the South Atlantic States queried on this point placed poison oak and poison ivy at the top of the list. Other offenders regarded as important were primroses and African violets.

ing the famous Mammoth Cave. A considerable area overlying this formation, immediately west of the Knobs, has no surface streams but drains through the cavernous rock. Lying between the Green and Cumberland Rivers is a moderately high plateau, cut comparatively little by streams, which contains rich farming lands largely devoted to the culture of the dark type of tobacco The areas drained by the Green, Salt, and Licking Rivers are broken and hilly The Kentucky and Licking cross the bluegrass area, the former in a gorgelike valley and the latter through a very hilly and irregular district The narrow valleys of the Kentucky, Licking, Big Sandy, and upper Cumberland Rivers, seldom more than a mile or two in width and often less than a mile, have depths of 100 to 600 feet. Extraordinary differences of geological formations within the State give distinctive characters of the soil

Climate. Although continental in character, with rather wide extremes of temperature and precipitation, the climate of Kentucky is generally temperate, healthful, and well adapted to a varied plant and animal life The State lies within the path of the moisture-bearing low-pressure formations that move from the Western Gulf Region northeastward over the Mississippi and Ohio Valleys to the Great Lakes and the Northern Atlantic Coast The greater part of the precipitation is obtained through the agency of these pressure formations, which vary greatly in frequency, character, and force. There is, consequently, considerable variation in the amount of moisture received, as well as, in the other climatic elements in individual months, seasons, and years.

The average annual precipitation in the mountain districts is three to six inches more than over the bluegrass area to the west Comparatively little influence on temperature can be traced to the topography, but because of its geographic location with reference to the center of the continent, the midwinter cold waves from the Canadian Northwest usually reach Kentucky with their intensity considerably modified.

The mean annual temperature ranges from 54° in the extreme north to 59° along the southwestern border. The sum-



a single year The average is about one a year. Thunderstorms may occur in any month but are more frequent from March to September, inclusive. They are occasionally attended by damaging hail, but the area thus affected is nearly always small.

The percentage of possible sunshine averages 35 to 45% for the winter months, 50 to 60% for March and April, and 60 to 70% from May to October, inclusive.

Socio-Economic Characterization of Kentucky. Kentucky counties have been grouped into 10 social subregions by the U. S Census Bureau. Subregion I, the Jackson Purchase, is composed of eight counties located at the westernmost tip of Kentucky Paducah is the largest city in the Purchase Area. Between the Ohio and Tennessee Rivers at one margin and the Western Coal Field at the other, is located a semicircle of 10 countries known as Subregion II, the Highland Rim and Western Coal Field Margin The development of oil and gas resources have helped in the increase of population The north-south column of eight counties reaching from the Ohio River just west of Louisville to near the Tennessee boundary comprises Subregion III, the Central Kentucky Knobs There has been little gain or loss in the population of this area for 60 years The Outer Bluegrass Subregion IV is a ring, two counties wide at most points, of 27 counties enclosing the inner Bluegrass The Highland Rim and Cumberland Plateau Margin, Subregion V, is a long strip of 24 foothill counties slanting Northeast-southwest, tapering from four counties along the Ohio and Big Sandy rivers to one county at the center, and then widening to five counties at the Tennessee border This area is intermediate between the Bluegrass areas in the west and the mountainous Cumberland Plateau on the east, in population trends, as in terrain The Western Kentucky Coal Field Subregion VI is composed of the eight counties lying between the Ohio River and the Pennyroyal area Although this is an area in which coal mines have developed, an increase in population has not followed as rapidly as in the Eastern Kentucky Coal Fields The demand for labor in coal production in this area has probably passed its peak. The Inner Bluegrass Sub-

mer maxima usually reach or slightly exceed 100°, but rarely on more than a few days. Minimum temperatures below zero occur with moderate frequency in December, January and February, but severely cold weather seldom predominates longer than 60 days, and long, cold periods are always broken by intervals of moderate temperature.

The average date of the last killing frost in spring ranges from April 9 in the extreme southwest to April 23 in the mountain region, and that of the first frost in fall from October 15 on the Cumberland Plateau to October 24 near the lower Ohio River. The average length of the growing season varies from 176 days on the southeastern plateau to 197 in the extreme southwestern part of the State. The growing season has been as short as 149 days and as long as 232.

The average annual precipitation ranges from 40 to 46 inches in the northern half of the State and from 46 to 50 in the southern half, approximately half of it occurring in the warm season, April to September.

Twenty-four-hour precipitation in heavy rains is frequently three or four, occasionally six, and as much as 10 inches in some extremely heavy falls.

During the growing season there is usually sufficient rain for staple crops, and occasionally there is too much, especially in the spring months, delaying planting and cultivation. Drought conditions sometimes prevail, but even in such periods local rain prevents complete crop failures

Snowfall varies considerably from year to year, the average annual amount ranging from 10 inches in the extreme southwest to 20 inches in northeastern districts. The ground seldom remains covered with snow for more than a few days.

Southerly to westerly winds prevail over the State in most months. During the colder months, north or northwest winds predominate at times. The average velocity of the wind ranges from 6 to 13 miles an hour with maximum velocities from 40 to 60 miles. Storm winds, generally squalls attending thunderstorms, occasionally exceed 60 miles an hour. A number of years pass without a tornado, or several may visit the State in

migrants went to northern cities. Twelve out of every 100 residents of Cincinnati in 1930 were born in Kentucky. It it probably true that youth is Kentucky's major export product.

More than one-third of all the employed people in Kentucky are engaged in farming and related work. This is about twice the national figure. There were about five times as many workers in agriculture as in transportation and other utilities, or personal service work, or mining. However, the percentage of the labor engaged in mining was more than three times the national figure

Kentucky farmers receive about half of their cash income from the sale of crops and half from the sale of livestock and livestock products Corn occupies five to ten times the area used by tobacco and one-fourth more than that of hay. However, the direct cash income from corn is little more than one-twentieth of that from tobacco because most of the corn is fed to livestock on the farms The total farm value of corn equals or exceeds that value of tobacco. The low income of farmers is the greatest agricultural problem in Kentucky. This is probably the result of over-population and loss of soil fertility

Prior to 1940 there was a relative dearth of manufacturing in the State During the last War and since, there has been some measurable rise in the amount of industry located in Kentucky Louisville and other cities lead in this endeavor, but many smaller towns are fostering and welcoming "outside" interests to place factory sites in their respective communities The average income in Kentucky is less than the average for the whole nation It is believed that the standard of living in Kentucky would be higher if there were more manufacturing in the State because there would be more jobs and a greater production Six counties facing the Ohio contributed more than 81% of the value of manufacturers, while 92 inland counties contributed less than 11% The State is handicapped by a low income and wage level due partly to a relative abundance of labor and partly to an inefficiency in the use of her manpower

region VII, composed of eight counties, is located within the Outer Bluegrass circle. Its rural population has changed less than any other subregion in the State. Unless there is a major change in the agricultural economy the rural population will probably remain stable The Pennyroyal, Subregion VIII, is comprised of five counties, side by side, along the boundary of Tennessee, south of the Western Coal Fields. The historical combination of resources, people, and levels of living would not point immediately to much change of population in this area. The Cumberland Plateau, subregion IX, has had a greater growth of population than the State as a whole. There has been no pause in the population growth to indicate the attainment of a balance between people and resources. There must be continued subdivision of farms and sharing of material resources in smaller portions unless the rate of growth decelerates. Metropolitan Areas, Subregion X, is comprised of two Metropolitan Areas, Jefferson County is the Louisville Area, and Kenton and Campbell Counties are the Covington Areas.

In 1940, seven out of 10 people in Kentucky were rural, and about five of them lived on farms. More than one-third of the urban dwellers lived in Louisville, while there were 74 counties without any urban people at all. Thus the population is mainly rural, and nearly all white and native born There is an uneven distribution of people on the land due to the uneven growth in the different subregions. In 1940 in all of Kentucky there were 71 people per square mile. However, inter-county differences ranged from 1,027 in Jefferson to only 27 in Menifee. The area most thickly settled with rural farm people was the Cumberland Plateau Subregion which is comprised of the eastern mountain counties in Kentucky Farm population density may be measured by the number of acres of cropland per person. This density ranged from two acres in Harlan County to 25 acres in Union County. It is generally observed that the smallest per capita acreages were in areas of low agricultural productivity.

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Allergic Factors Special to this Region. The per capita incidence of allergy in Kentucky probably ranks in the upper brackets. Although there is no one special factor to account for this, the geographic location, climate, and topography contributes toward producing an allergic milieu. The climate is conducive to a luxuriant growth of vegetation which has a relatively long growing season. This accounts for a fairly high pollen index. Prevailing winds, especially in dry weather, assures a wide pollen distribution. The character of the precipitation and humidity favors the concentration of pollen close to the ground. The profuse mold growth and high mold spore count, in turn, imputes a favorable temperature environment. "Smog" is not a problem but fog often is This is particularly true in the valleys of the mountain regions and along the river basins, with which Kentucky abounds. The physical ill effect of considerable damp and rainy weather, often alternating with extremely hot and humid weather, on those patients who are susceptible, is reflected by the high incidence of repeated allergic and predisposing upper respiratory disease manifestations.

Pollen and Mold Incidence. From the preceding discussion and description, one can readily understand that the pollen content of the atmosphere during the pollinating season is rather plentiful.

Ragweeds. Because ragweed pollen is the chief offender in Kentucky, it assumes first place in consideration of pollens Short and giant ragweed are outstanding in all parts of the state, supplying 95 per cent of the pollen content of the air during late August, all of September and early October Southern ragweed *(Ambrosia bidentata)* is found in restricted acreage in the counties bordering the Mississippi River, but its total contribution to the ragweed pollen content of the air is probably negligible So also is the contribution of cocklebur *(Xanthium Spp.)* and marsh elder *(Iva ciliata)*, which often escape recognition as ragweeds. Cocklebur grows profusely in all waste and cultivated areas throughout the state The strong skin reactions to cocklebur pollen in ragweed sensitive cases—

frequently greater than to short or giant ragweed—suggests it may be a primary offender. However, contact with cocklebur pollen, even in a cocklebur infested area, has proven to be no more than two per cent of that of short and giant ragweed. Marsh elder grows in low, wet land along the Ohio River but not in other parts of the state. The weed grows rather abundantly, but the pollen has not been individually evaluated.

Weeds of Minor Importance. The chenopods (goosefoot) and amaranths (careless-weed) which are of prime importance in the Prairie and Plains States, are of little or no importance as a cause of inhalant allergy in Kentucky. Lamb's quarters and Mexican tea are common local members of the chenopod family. Rough pigweed (redroot) and spiny amaranth are common local amaranths, but regardless of the abundance of chenopods and amaranths on farms, gardens and waste places during the summer and fall, the total volume of airborne pollen from all species is negligible. Rarely, can it be proven that anyone is clinically affected by them. Positive skin reactions will, of course, occur in persons who have been sensitized to Russian thistle, Palmer's amaranth and other active members of these families by residence in areas where the pollens of these weeds are prevalent. Hay fever occurring in Kentucky, during the interim between grass and ragweed season, is frequently accounted for by pollen of English plantain or fungus spores than by chenopod or amaranth pollens. English plantain (*Plantago lanceolata*) is rather profuse and widely distributed and often accounts for hay fever symptoms occurring toward the end of June and early August. Red sorrel (*Rumex acetosella*), a dock species which grows freely on acid soil, is responsible for a moderate amount of air-borne pollen during the grass season, but the allergenic activity is decidedly low, and cases of specific sensitization to it are rare indeed.

Grasses. Kentucky bluegrass, bluegrass or June grass (*Poa pratensis*), from which this state has received its pseudonym, and Timothy (Phleum protense), are the most dominant and important grasses throughout the state. The importance of

Kentucky bluegrass to this discussion is both botanical and economic. From the latter viewpoint, its greatest cultivation is in a large circular area in Kentucky, with a point 25 miles north of Lexington as a center. Its distribution is closely confined to the Cambrian rocks, which are rich in lime and magnesia. It is one of the most nutritious of grasses. Perhaps, no other grass is so acceptable to stock as bluegrass and it is a notable fact, that stock raising in Kentucky has become famous for that reason. So highly prized are the bluegrass pastures in many sections that they are seldom broken up.

Timothy, is cultivated in the area surrounding the central bluegrass region because it is the leading source of hay as well as its excellent seed habits. It is an excellent feed for livestock, particularly, horses, and for other reasons. During May and June, bluegrass and timothy reach their height of pollination and may even be a source of antigenic stimulation as late as July, or occasionally, early August.

Redtop *(Agrostis alba)*, Bermuda *(Cynodon dactylon)* and Johnson grass *(Sorghum halepense)*, follow bluegrass and timothy in abundance. The first of these three is widely distributed and occupies the whole of the timothy and bluegrass regions and extends considerably farther south. The only section in which it holds first place is a limited area in the northeastern part of the State adjacent to illinois. The other two grasses, Bermuda and Johnson, are most prevalent in the southern part of the State, the latter was originally imported into South Carolina from Turkey.

Other grasses, including Orchard *(Dactylis glomerata)* and Fescue *(Festuce elatior)*, are widely present but ordinarily not comparable in activity but are important cross reactors, especially, orchard grass

Trees. The native trees are widespread throughout the state. Oak and elm perhaps are the heaviest pollen producers However, sycamore, black walnut, hickory and maple are relatively plentiful and important pollenators. In general, the trees are minor agents as a source of hay fever. Sycamore has a decided specific effect on susceptible individuals, insofar as

a fuzz from the under surface of the leaves exudes a glue-like substance which apparently is air-borne and antigenic. Tree pollination normally lasts from March through May. Elm often reaches anthesis in February. Occasionally, a long winter may delay the onset to as late as April. This, followed by grass pollination, contributes to more than usual high incidence of spring hay fever victims.

Miscellaneous pollen groups of almost negligible air-borne allergenic importance, includes grains, such as corn and rye and herbs, such as alfalfa and clover, which are not too widely distributed except, possibly corn pollen.

Molds. These are significantly important, from the allergenic standpoint, in Kentucky. However, their distribution seems to be related to whether they are found in outdoor air or in house dust A comprehensive survey in 1948 of outdoor air, indoor air and house dusts showed the four predominant molds to be *Alternaria*, *Aspergillus*, *Hormodendrum* and *Penicillium*, which are genera of the Fungi Imperfecti Penicillium was the most prevalent mold found outdoors, indoors and in house dusts. Hormodendrum roughly represents about one-fourth the per cent of Penicillium and appeared to be evenly distributed in the three sources sampled but less than Aspergillus and Alternaria in house dusts Regarding localities, the highest average percentage of total counts were generally found in the greater central area of the state.

Smuts and rusts are generally found in those areas where farming is the major occupation

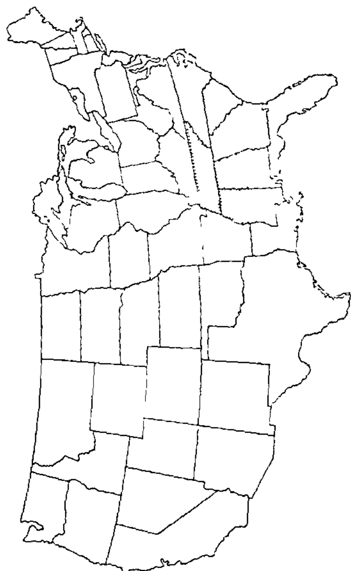
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Tennessee

By Edna Scott Pennington, M.D.

The area which is herein surveyed from the standpoint of the allergic patient comprises the State of Tennessee and the northern halves of Mississippi and Alabama. This consists of three somewhat different types of terrain with varying climatic conditions, pollen and mold problems, and economic conditions These areas correspond roughly to the conditions prevailing respectively in Central, Eastern and Western Tennessee. Since Nashville, in Central Tennessee, is the point from which most of my studies and observations have been made, my remarks will be directed to this area and variations from this of the other portions of my territory noted.

Geography. Central Tennessee and Northern Alabama consist of rolling wooded country alternating with areas of cultivated land The elevation of Nashville is 577 feet and much of Northern Alabama and Central Tennessee varies only a little from this Birmingham, the largest city situated at the southern boundary of the area described has an elevation of 835 feet. Eastern Tennessee is mountainous and wooded. It contains the City of Knoxville in the north which, at an elevation of 950 feet lies between the Smoky Mountains and the Cumberland Mountains, and the City of Chattanooga in the extreme southeast where at an elevation of 688 feet it is surrounded by mountains of the Appalachian Chain. West Tennessee and Northern Mississippi consist chiefly of low flat lands with occasional hills and streams. Memphis, the large city of this area and the largest in Tennessee lies on the Mississippi River, as does the western border of Mississippi, and is surrounded by fertile flat lowlands part of which is known as the Mississippi delta The altitude of Memphis varies from 117 to 397 feet and the surrounding country is lower.



Climate. The climate varies somewhat with the latitude and with the topography of the three regions. Situated in the south and midsouth of the United States the temperatures vary from a few days or weeks of below freezing weather, rarely reaching zero, to a rare high of 100° in midsummer.

In Eastern and Central Tennessee and Northern Alabama the winters are short and, except for brief periods, relatively mild. The summers are long and the night temperatures usually comfortable although days may become hot. The average annual temperature in Nashville is 59 2° and the monthly average varies from the low 40's in January to the low 80's in July. The average relative humidity is moderate as compared with general conditions east of the Mississippi. Rainfall is more than ample with an average annual precipitation of 46 25 inches The average snowfall is eight inches and usually continues only a few days. Winters from November to March being mild have much cloudy damp and rainy weather In 1951 there were 93 clear days, 117 partly cloudy and 155 cloudy. Nashville and Birmingham have considerable amounts of smog in winter. Nashville is particularly troubled with this because of the surrounding hills but some progress has been made the last few years in overcoming this situation Killing frosts end with March for most of Central Tennessee and seldom arrive before October 15 and not later than November 1. Wind velocity is low, the average hourly speed being 7.1 in 1951 and the prevailing direction South.

Memphis, Western Tennessee and Northern Mississippi have hotter more uncomfortable summers and milder winters. There killing frost ends in mid March and returns about mid November. This area has slightly heavier rainfall with an average of 50 inches It has more days of sunshine, 113 in 1951, and somewhat more wind with an average 10 7 hourly speed in the same year

The temperature of Knoxville is somewhat moderated in summer and winter by the mountain chains on both sides of it There is an average diurnal variation of 20° so that the nights are cool and sudden great temperature changes occur infre-

quently. As might be expected there is slightly more snow than in Nashville as well as heavier precipitation (51.50 inches). The climate of similarly situated Chattanooga is as near that as would be expected from its latitude 100 miles south

Population and Industry. Formerly the area under discussion was largely rural and agricultural. Farming was the chief industry in fertile Western Tennessee and Northern Mississippi where cotton was and is the major crop Farming is also important in Central Tennessee and Northern Alabama where cotton, tobacco and small grains are produced Grazing and cattle raising are widespread here and are becoming more important in the western part of the State. Eastern Tennessee and parts of Northeastern Alabama are mountainous and less densely populated Here many areas are valuable chiefly for grazing and timber which form the basis for their agricultural industries Coal and iron ore are also mined in these areas. The development of Tennessee Valley Authority projects at Norris Dam, near Knoxville, Muscle Shoals in Northern Alabama and projects on the Cumberland River in the Chattanooga area have encouraged the entrance of large numbers of industrial plants As a result, the large and small cities in these areas are rapidly becoming industrialized This has been encouraged by the excess of labor both white and colored.

Wages for labor in the eastern part of Tennessee are in general low, those of Central Tennessee somewhat higher and in Memphis still higher Cost of living with rents, food and clothing as well as fees to doctors, tradesman and other artesans roughly parallel these differences. Living costs in all of this area are somewhat less than in major cities of many or possibly most parts of the country although such differences are gradually tending to equalize

Nashville has a population of 174,307; Chattanooga, 131,-041, Knoxville, 124,769, and Birmingham, 326,037.

Inhalant Allergenic Factors other than Pollen. In all of this area house dust is a major factor to be considered. There is much cool damp weather with resulting closed houses and use of artificial heating from the end of September until early May

During this period house dust is a major cause of allergic symptoms, overlapping as it does the latter half of the ragweed season and much of the tree pollen season Since temperature is below freezing for only a few days or weeks molds are also present in the inside and outside air most of the year Cottonseed, tobacco and corn smut are locally important as inhalant allergens in farmers and others handling these products and occasionally in the neighborhoods of cotton gins and tobacco floors where tobacco is cured or marketed Prevalent airplane spraying of cotton fields causes complaints from some asthmatic patients in cotton growing areas. Ceresan treated sacks used for cottonseed for planting appears to be violently allergenic to some handlers

Perhaps the household allergens are especially important in this area because the bulk of the permanent population lives in homes and houses, not apartments. Many of them own these homes and have kept some of their furniture and often their same houses for years and sometimes for generations Pillows of their mothers and grandmothers, and in the rural areas, featherbeds are the rule rather than the exception Much of the population keeps pets, such as cats, dogs and chickens even if not occupationally associated with animals. Industrial workers in Central and Eastern Tennessee often live nearby on a small acreage or maintenance farm

Molds are a fairly important cause of allergic disease in the area under discussion They are allergens requiring consideration in the indoor air especially in winter and in the outdoor air most of the year. Certain mold spores are seasonal in their occurrence and reach considerable concentration in midsummer particularly during "hot dry spells" *Alternaria*, *Hormodendrum* and smut are of major importance in patients with excessive symptoms during hot dry periods from June 15 through September 15 *Helminthosporium*, *Acrothecium*, *Spondylocladium*, *Acrothecium* and *Macrosporium* are of minor importance.[2] *Cephalothecium roseum*, smut, *Aspergilli*, *Penicillia* and *Rhizopus* appear to be of some clinical importance perennially. In our area no patient is completely exam-

ined for allergenic sensitivity without a mold survey. Only those with symptoms coinciding strictly with pollen seasons should probably be exempt and even of these a few seasonal ragweed patients react strongly to *Alternaria* and do better when such extract is added to their treatment.

Pollen Allergens. The pollen season throughout this area is long and may be divided into tree, grass and weed pollen seasons with the grass season somewhat overlapping the other two

Tree pollen season begins with the first warm days of spring, and continues until the end of May. In addition cedar pollen is found in the air from the first of December through March during which time it is a minor cause of symptoms requiring treatment in only a few patients Elm pollen may appear as early as late January or February and continues through part of March depending on the weather. During March ash, and maple pollen join that of elm April brings black walnut, oak, birch, beech, boxelder, hackberry, poplar, cottonwood, mulberry and sycamore Sweet gum, ironwood, and hornbeam are more abundant in the more southern parts of the area as is pecan which has a peculiarly toxic and allergenically important pollen Pollens of oak, willow, birch, pecan and sycamore usually continue in the air through most of May but are entirely gone before June 1.

Grass pollen appears in the air in Nashville in late March or early April and about two weeks earlier in Memphis and other southern portions of this area [1] It is an important cause of trouble from May through mid July and remains in small amounts until killing frost *Poa annua* appears first and is followed by *Poa pretensis*, Bermuda and other species of grasses common to this and most other regions of the United States particularly in the South Johnson grass abounds and blooms until frost but its heavy pollen is not widely disseminated.

Weeds. Dock pollen *(Rumex crispus)* appears in April and some varieties continue into July Plantain *(Plantago lanceolata)* blooms abundantly and appears in the air from mid May to mid June during which time it and dock are a

minor cause of trouble and are frequently added to grass pollen extracts in treatment.

From mid July to mid August only an occasional pollen granule of grass, dock, plantain or amaranth are found in the uptown air and this mid summer season is considered by us to be relatively pollen free. Patients having trouble during this time, especially during a "dry hot spell" are those regarded as probable candidates for mold sensitivity.

Ragweed pollen is found in the air from the middle of August to the killing frost occurring usually in late October. This reaches its height the first and second week in September and continues in low volume until frost. The ragweed pollen season is only relatively heavy in this section, being greater in Western Tennessee where the ragweed pollen index of Durham is 76, less in Central Tennessee where the Nashville index is 68 and lowest in Knoxville where it is 49, and almost absent in the higher parts of the Smokies, 4 and 13 In general, ragweed pollen is more abundant in the northern section of the area gradually decreasing southward as evidenced by the index of 68 in Nashville and 33 in Birmingham directly south of it. It is also more abundant in the western portion than in the eastern, probably because of the nature of the terrain. The pollen of annual sage is found in small amounts for about three weeks in September and is a minor cause of symptoms. It is frequently added to ragweed in treatment Fall blooming elm also throws pollen into the air in small amounts in the Nashville area in September but has never been proved by us to be clinically important even in patients extremely sensitive to elm.

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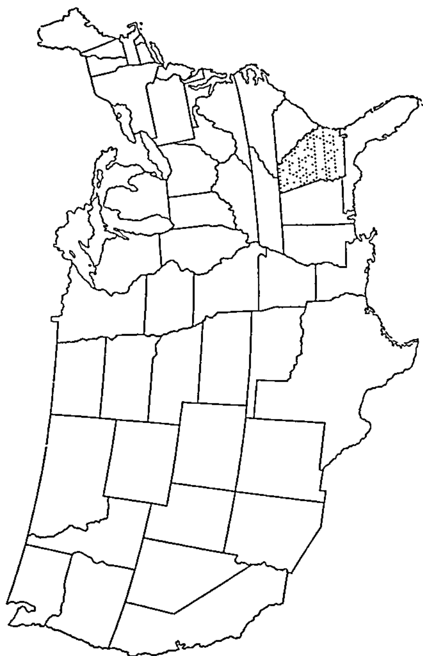
Georgia

By J. L. Jacobs, M.D.

GEOGRAPHY. Georgia may be divided into three zones sufficiently different markedly to influence the character of the vegetation The first and largest is the coastal plain of roughly 35,000 sq miles, extending from the Atlantic Ocean, to the "Fall-line," which passes through Augusta, Milledgeville and Macon, to Columbus This area has an average elevation of about 250 feet North of the coastal plain lies the Piedmont Plateau, extending from the "Fall-line" to the mountains at elevations averaging from 600 to 1700 feet, a well-drained area which supports the majority of the state's population. Farther north is the heavily forested mountain area, including portions of the Blue Ridge and Great Valley Regions, and in the west the southern tip of the Cumberland Plateau Here the elevation often ranges from 1700 to 2000 ft in the valleys to 3000-4000 feet on the plateaus and ridges

Water is abundant throughout the State, with a mean annual rainfall of about 50 inches, being very heavy—about 70 inches, in the extreme Northeast and about 45 inches annually along the Fall-line The principal rivers of the State all rise in the upper part of the Piedmont Plateau uniting to form the Apalachicola in the southwest, the Altamaha in the southeast, and the Savannah River to the east The large Okefeenokee swamp influences the flora of that section In the northern part of the State are several large artificial lakes,—Rabun, Burton and Hiawassee Water for agricultural and industrial purposes is ample throughout the State.

Climate. Georgia's climate is mild, average monthly temperatures on the coast ranging from about 54° in January to 82° in July, in the mountains from 40° in January to 74° in



July. Mean annual temperatures range from 57° to 68°. Snowfall averages about seven inches annually in the mountains; in other parts of the State snow is a curiosity. The Piedmont Plateau is noted for its healthful, well balanced climate, conducive to either agricultural or manufacturing operations In winter the harshness of the cold air masses that blow in from the central part of the country is largely broken by distance and the mountain barrier In mid-summer temperatures, while often averaging 90° at mid-day, usually quickly fall to below 80° after sundown. Houses often will not cool as fast as the outside air, leading to the widespread use of attic fans in the central and southern parts of the state, and rapidly increasing use of air-conditioning units

Humidity is adequate to support abundant growth of molds, especially near the seacoast and southern swamp area. Widespread use of soft coal for heating purposes has led to rather severe smog conditions in the major cities in the past, but this has been greatly lessened and is constantly improving due to increasing use of gas, oil and stokers, and the activity of local smoke abatement groups. Droughts are not common, but in exceptional summers they may bring hot weather for a period of weeks Temperatures below 15° are rarely seen over most of the State, and then only for a few hours at the height of a cold wave

Social Structure. The population of approximately three and one-half million averages about one-third negroes, the proportion of whites being greater in the northern and smaller in the southern part of the State Foreign-born whites are few in number Cities and towns, especially manufacturing and distribution areas in the Piedmont Region, have grown rapidly. The population of metropolitan Atlanta, an important railroad, distributing and manufacturing center, noted for its beautiful homes, has now reached three-quarters of a million

The larger part of Georgia's population is concentrated north of the Fall-line where is found extensive diversified farming and manufacturing, led by textiles Pine forests occupy large areas to the South yielding turpentine, pulpwood and

extensive grazing areas for cattle, with shipping, shipbuilding, and recreational areas along the coast. Manufacture of paper from pulp wood is a rapidly growing industry in this area. North Georgia contains a number of mountain summer resort areas. Agriculture has become largely mechanized and farms are about 95 per cent electrified. Cotton is an important crop but now accounts for only a small part of the farm income of the state. Georgia has benefited from the high farm income of recent years, and notable improvement in rural housing has resulted. The recently enacted 3 per cent sales tax has made possible greatly increased appropriations for constructing and improving schools, equalizing educational opportunities, and for the construction and maintenance of main and secondary paved roads. County hospital construction has been pushed, and most farming communities have, or soon will have, easy access to hospital facilities. Georgians are strong supporters of religion, and churches are well attended and are a vital part of every community. Resort facilities at state parks are available in the mountains, Central Georgia, and on the coast.

Special Allergenic Factors. The Southeast has a combination of warm climate and ample moisture which must place it among the regions most favorable for the growth of molds and bacteria. Thus one might expect that house dust antigen, which appears to be so closely related to the activity of molds, would play a highly important role in vasomotor rhinitis and asthma, which is indeed the case Most cases of pollinosis appear to be significantly influenced by an accompanying allergy to house dust. Sinus conditions associated with allergy to house dust and upper respiratory bacteria, especially *H influenzae*, are frequently seen from November to March

For several years we have been skin testing patients with aerobic bacteria from the Atlanta area and the large number of positive reactions, especially in hay fever patients, suggests the possible importance of further studies in this field Presence of a dominant allergy to *B coli* in about 30 per cent of eczema cases in this area was reported by us in 1950, and since this type of allergy is frequently worse in hot weather we may

TABLE I
AERO ALLERGEN RECORD FOR ATLANTA, GEORGIA, 1951

	Jan	*Feb.*	*Mar.*	*April*	*May*	*June*	*July*	*Aug*	*Sept.*	*Oct.*	*Nov.*	*Dec.*	*Total*
Alder	3	68	1										72
Alternaria			4	1	6	18	28	28	30	26	15	7	171
Amaranth			3	9	4	2	6			1			25
Artemesia					1								1
Ash			6	11	2								19
Beech				16									16
Birch			65	24									89
Cedar	1	14	6	1					1				23
Cocklebur			1								1		2
Dogwood			12	16	4								32
Elm (winged)		132	3										135
Elm (white)				5									5
Grass			9	30	19	8	9	5		2			82
Helminthosporium							3		1				4
Hickory		2	2	6	9								19
Hormodendrum		1	1		4	5	4	2		3		5	25
Magnolia					2		1						3
Maple				36	13								49
Mulberry				14	1								15
Oak			69	244	33	1							347
Oak hairs				1	13						1	1	16
Pecan				3	6								9
Pine		6	143	177	27								353
Plantain					3								3
Poplar				13									13
Privet				9	18								27
Ragweed						1	1	3	70	16	3		94
Rumex				9	10	2							21
Rust									1		2		3
Sheep sorrel						1							1
Smut						2	15		3	5	1	1	27
Sourgum				2									2
Sweetgum			20	15									35
Sycamore				14	6								22
Tulip tree					1								1
Unknown mold					1	1	2	8	1	1		2	16
Unknown pollen													
Total	4	1 224	345	1 637	3 188	41	69	6 52	3 116	56	23	16	14

Monthly totals of pollen grains and mold spores counted in area of one sq cm on slides exposed daily on roof of an 11-story building near center of city

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13

Florida

By Clarence Bernstein, M.D., FAAA, FACA
Orlando, Fla.

In directing a patient to remove from a lifelong habitation to *any other* locale a physician undertakes graver responsibilities than many realize. If the move is recommended for reasons of allergy, is he certain that the patient does not carry his antigen along with himself as food, feather or fear? Does he go to an area where there is *less* of that to which he is sensitive? Or does the change in climate merely expose the individual to less wide a range of seasonal temperatures, hence allowing him to live with his allergies more comfortably? Unless by the move the patient is separated from an over-demanding employer—or a dominant mother-in-law—in all probability the psychosomatic factors will be unaltered. The ragweed-sensitive patient may still react to the freshly pyrethrum-sprayed hotel or tourist court whether he be in Florida or Philadelphia.

Geography and Climate. Geographically, the State of Florida is primarily a peninsula of low-lying, rather flat sandy terrain. It extends from the Keys at its southern tip near the Tropic of Cancer north to just above 30 North latitude. While Florida is officially Temperate Zone in location, the Gulf Stream which brings warm currents of water close along the entire East Coast, and a prevailing easterly wind give the State, for the most part, a subtropical climate, at least in the southernmost half. The peninsular portion of the State is roughly 90 to 100 miles wide, and countless lakes, swamps, marshes, bayous, inlets and 19 navigable rivers both temper and moisten the air. The coast line is 1150 miles long enclosing an area 58,666 square miles of which 3805 square miles are water. Florida can be divided into three zones of 150 miles each in

see more of this than workers in other sections. More recent observations support this finding and indicate that liver depletion and avitaminosis, suggestive of a pellagra-type syndrome, are often closely associated with B coli allergy. Urticaria, migraine and constipation are frequently seen in these cases.

Pollen and mold slide counts carried out in Atlanta (*see* Table I) show peaks for alder and elm in February; birch and sweetgum in March; ash, dogwood, grass, maple, mulberry, oak, pine, and sycamore in April, pecan, privet and rumex in May. During June, July and early August more mold spores, especially *Alternaria*, were found than pollen grains, the most numerous of the latter being grass and amaranth. Ragweed reached its peak in September, and *Alternaria* in September or October. In October and November mold spores were again more numerous than pollen grains while December and January showed few of either

Clinically, active dust-mold hypersensitivity usually appears to be present in this section in most patients with seasonal pollen allergy, and should be treated simultaneously in order to achieve the best results

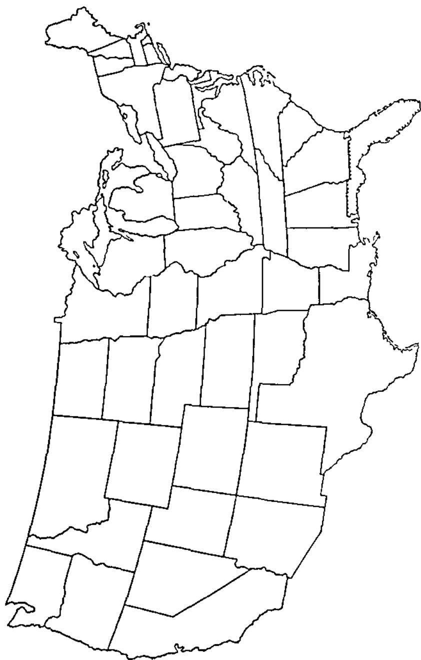
In a general way clinical experience confirms the importance of the marked Spring and Fall pollen peaks observed in the monthly pollen totals shown on the bottom line of the table Except for the comparative unimportance of pine pollen allergy the seasonal totals shown in the extreme right-hand column of the table may be considered to be roughly proportional to the clinical importance of the various pollen grains and mold spores studied.

north-south direction corresponding to temperate, sub-tropical and tropical classifications if one wishes to magnify the small but consistent differences between these belts, (Miami actually has a sub-tropical marine climate) The range between the mean summer and winter temperature is about 20° but extremes of 105° above and 2° below zero have been recorded. In 1950, in Miami the highest temperature was 94° on May 26, and 90° was reached only nine times. Snow is seen in the north of the State—and light frost is not too uncommon. Killing frosts are happily rare

The sandy soil is helped in fertility by the moisture, the rainfall being about 54 inches annually, most of which falls in the summer Average daytime humidity in Miami is 68%, night, 86%, in Orlando, 64% and 89% for comparable figures. Florida is continually swept by winds and in the Fall the West Indian hurricanes often do considerable damage. Both the direction and the velocity of these gales influence sharply the overall allergic symptomatology in the area.

Except for the Capital, Tallahassee, and Orlando near the center of the peninsula, the principal cities are along the coast and likewise the population centers Even the largest centers are not classifiable as manufacturing Oil, gas or electricity is used for heating in general. Hence smog is no problem. On the contrary the air is usually crystal clear and the many white buildings remain so indefinitely Despite the abundant rainfall much fertilization of the soil is needed, and because of the moisture and multitudinous insect and parasite varieties, spraying of crops, homes, and brackish waters add further complications to those already arranged by nature

Social Structure. "Go to Florida" at one time meant a prescription for health, for relaxation, or for easier living The area attracted people from every walk of life, particularly so if any *other place* than their own beckoned them *away from* an unpleasant, untenable, unsuccessful or otherwise insecure life situation Cardiacs have always done better in more equable climes The victims of chronic or frequent "colds," "bronchitis" or "asthma" also feel relieved in the warmer tempera-



ond floor this is much less likely. In general, winter heating is by hot air, or space fuel-oil burners Flash heat is needed for a short while in the mornings as the days warm up as soon as the sun has shone for an hour or two. During the winter it is a common practice to keep bedroom windows closed at night where youngsters or adults have a tendency to "croupy coughs"

Winter season rentals run relatively high, though on an annual basis they are at about standard for the nation as a whole. Schools have improved at every level and more progress is continually being made The State is very church-conscious, and all denominations are well represented. There is a large negro population mainly employed in agriculture and as domestics. Segregation is strictly practiced but inter-racial relationships are gradually improving along with better housing and civil rights There are very few free or low-cost medical clinics in Florida, and the sick must generally seek private medical care There are some county and city hospitals but these give in-patient care primarily.

Special Allergy Problems. As a rule pollen counts are quite low in Florida, especially in the southern two-thirds. Patients coming in from other areas note prompt benefit in most instances and it appears to be solely on this quantitative basis. This factor cannot be too strongly emphasized as it is the principal advantage of Florida for the severely grass-, or ragweed-sensitive patient from the North and Middle-West This region continues to offer relief to that group of patients, who, over the years, have sung the praises of the state as a hay fever and asthma haven

Florida deserves special consideration allergically because it affords predominantly an out-of-doors existence House dust is a problem only during the few winters when the weather may be cold or confining for longer than the usual brief periods *Even so,* mold in the dust is more important than the usual linters and other materials, since overstuffed furniture and wool carpeting are less commonly used *Homes* are likewise widely open to gusty winds One also finds sand

tures. Many of these individuals emigrated from the North and made their homes, had families and managed to establish themselves in the local economies: in groves, cattle, business ventures, real estate, etc. It has been said that only doctors, lawyers and insurance men do well in this State. This appraisal, while exaggerated, does give a little of the actual picture. The business and farmer groups have come and gone, failed or made good. The "Boom and Bust" sharply separated the sheep from the goats and there were many of the latter. The tourist business increased rapidly and with it the fantastic development of the Miami area. Prior to the widespread use of air-conditioning the summers were dull, business very quiet, and many of the natives or local inhabitants retreated north to the Carolina mountains or to New York State and to Maine. Now, however, Florida is a year 'round resort with a quite heavy summer tourist season. The families that came down from the North because of "sinus" or other related respiratory troubles, were, in many cases, victims of undiagnosed allergic disorders —and so many of them in second and third generations have inter-married, that the hereditary factors are being dramatically revealed in the very high incidence of allergic diseases encountered. This is further heightened by the manifold and varied allergenic exposures to be found here. The out-cropping of the psychogenic factors from the later intermarriages within this type of family background also begins to show up, and the land of ease, milk and honey begins to present many common everyday problems Even the true respiratory infections, bacterial and viral, appear in Florida very soon after an outbreak in New York or Chicago due to present-day rapid transportation Plane and train bring the victims of these infections into the community even before the short incubation periods have ended Doctors are kept quite busy despite a great increase in the number of physicians throughout the state

Living quarters are not so air-tight or so well insulated as in the North. The average home is a one-story, poured concrete base, masonry-wall type house The ground floor is usually "damp" and shoes and clothes mold here, whereas on the sec-

plete. Work is in progress to gain fuller information. The puzzling entity, X-hay fever, is not yet solved. Wind direction makes a great deal of difference in allergic symptoms, and may be used to advantage in gaining relief for a patient. An easterly wind brings in completely clean air to the East Coast and can

TABLE I

PRINCIPAL POLLEN AND MOLD ALLERGENS OF FLORIDA

Grasses	*Trees*
Bermuda	Pecan
Johnson	Oaks
Timothy	Elder
St. Augustine	Australian pine (South Florida)
Natal	Juniper (?)
Rye (?)	
Weeds	*Molds*
Dwarf ragweed	Aspergilli
Giant ragweed (Not in Mid and South Florida)	Monilia
English plantain	Mucor
Spring amaranth	Penicillia
Redroot pigweed	Alternaria
Lamb's quarters	Cladosporium
Jerusalem oak	Pullularia
Sheep sorrel	Helminthosporium
Yellow dock	Gliocladium
	Fusaria
	Rhizopus
	Actinomyces
	Streptomyces
	Torula

be counted on frequently to relieve the ragweed harassed patient who is sent there for a few days if, of course, he is not too mold-sensitive

In the northern districts, pecan pollen presents a seasonal problem in the late winter and early spring The oaks cause more trouble in northern and central areas, less in the southern districts Molds are less a problem in the north and central than in the south, and are heavier in summer and early Fall in connection with the rainy season. On the coasts, however, and in moist areas mold is always to be reckoned with Some home-owners, regularly through the wet seasons, even when

rather than silt or earth deposits in the accumulated detritus in the homes, and being heavy and larger than the particles of ordinary household dirt it seldom gets into the circulating air. Being heavy, it even holds down the lighter particles in ordinary dust.

Of signal importance is the fact that there is no snow or killing frost in the area except rarely or for very short durations. There is no "quiet period" in the outdoor air. On the contrary, the lush vegetation, the moss, and the large leaves will hold the pollen grains longer or arrest their flight only to be picked up by a later gust. The sumacs and ligustrums, the poison oaks and ivies offer abundant contacts for skin irritations. The thunderwood tree, the poison-tree, (and at one time the manchineel), are extremely toxic for humans. Dermatitis from prolonged exposure to muck, and the various eruptions from direct parasitic invasion, such as "creeping eruption," are all seen with fair frequency. Skin and respiratory difficulties from exposure to sprays used to protect groves, crops, or nursery plants are encountered several times during any year. Allergy to sunlight is rather less common than the high incidence of exposure here might lead one to expect, and when suspected, porphyria must be ruled out.

In general one might say that in Florida the allergies to inhalants are less explosive or fulminant than in the North, and certainly less than in the Middle-West. This is perhaps due to the generally lower pollen counts and to the reduced range of temperature changes between the seasons as well as between indoor and outdoor air Likewise, pollen dosages in treatment go to higher levels generally in order to gain a satisfactory result. "X-hay fever," so-called, is found in Florida also and is an oft-described, little understood clinical picture

Molds and Pollens. Compared to other areas of the United States allergically Florida is still relatively "terra incognita" There are so many types of vegetation and pollens, some of the latter insect borne, and so many types of molds and opportunities for their growth and sporulation, that any final appraisal of the air content at this date would be woefully incom-

hot, light their heaters and run them high for 24-48 hours, in order to "dry out the house." Some of them feel they "lick the mold problem" this way The various pine trees (slash, Australian, spruce) which pollinate in spring have sometimes been regarded as important because their pollens appear on slides in some areas in appreciable quantities. However, the clinical correlation is not high except for Australian Pine which has been found often enough in the Miami area to warrant its use in treatment. There is the occasional report of Eucalyptus sensitivity, and in local areas, of mangrove, melaleuca and sea myrtle. Both the leaf and pollen of the Brazilian pepper tree have been considered allergenic

Recapitulation. The aerobiology of Florida is still relatively unexplored and needs more intensive and extensive study. The counts given in Table II represent pooled averages and show the low pollen counts for the state as a whole. A breakdown of these findings into the northern, middle and southern zones (approximately one-third of the state in each) show that South Florida has practically no ragweed, some Australian pine and grass pollens, and appreciable quantities of molds. Central Florida has less mold, slightly more grass, and appreciably larger amounts of ragweed pollen The oak season is clinically important while Australian pine is as yet no problem. The North Florida Zone is more like the southeast of the United States in general, with less mold, slightly more ragweed and a heavier tree season, notably pecan The entire Florida East Coast, favored increasingly from north to south by a prevailing east wind, shows lower counts especially in the Miami area Habitations along the coast, however, are notably moldier. It should be borne in mind that despite fine efforts at standardization, the interpretation of all "counts" is fraught with inaccuracies due to variations in station location, apparatus, counting method, and the observer himself. Suffice it to say, however, all counts in Florida are consistently low and from this angle alone would recommend the state to the pollen hay fever and asthma sufferer

In the preparation of this survey, I wish to acknowledge with

TABLE II

SIGNIFICANT POLLENS AND MOLDS IN FLORIDA—SEASON AND COUNTS (a)

Month →	*Jan*	*Feb*	*Mar*	*April*	*May*	*June*	*July*	*Aug.*	*Sept*	*Oct*	*Nov*	*Dec.*
Oak	5 +	237 +++	194 +++	27 ++	3 +							
Grasses (b)	16 +	20 +	24 +	65 ++	90 +++	43 ++	58 ++	41 ++	49 ++	32 ++	9 +	3 +
Ragweed					6 +	9 +	27 ++	73 ++	51 ++	21 ++	13 ++	
Amaranth		+			+	+	+					
Australian pine		Av 13	40 ++	++	+	+						
Alder	+	++										
Molds	+											
All others (c)	102	227	90	51	56	10	+ 15	++ 12	++ 11	++ 6	+ 7	+ 4

(a) Based on counts reported from over the state and on 20 statewide observation posts of Florida Board of Health, Division of Industrial Hygiene These estimates are subject to constant revision as further data yielding sounder "averages" are obtained Plus marks indicate months found and are at best only roughly quantitative

(b) Undifferentiated in counts Types found are indicated in tabulation of Florida grasses.

(c) Unidentified material including mold spores, smuts, insect eggs and larvae, etc

14

Cuba

By Jose M. Quintero, M.D.

ALTHOUGH my personal experience has been concerned mainly with Cuba, the greater part of the following data applies to other Caribbean Islands—particularly to Puerto Rico and Santo Domingo and with some variation to Jamaica and Haiti, where pollen and molds are similar. Conditions are also much the same in the Yucatan Province of Mexico

Physical Aspects. Cuba is the largest Island of the Caribbean, situated at the entrance of the Gulf of Mexico, being the nearest land to the United States with the exception of the small scattered Bahamas It has a length of 720 miles with an average width of 60 miles (maximum 120, minimum 22). The area is 45,000 square miles, including adjacent small islands and keys, which is about the same as the area of the State of Mississippi Distances to the mainland and other islands are. 90 miles to Key West, 140 miles to the mainland of Florida, 125 miles to Yucatan, 94 miles to Jamaica and 50 miles to Haiti. Cuba is not a mountainous country except in the extreme Eastern and Western Provinces and small sections of the center. The highest peak, near Santiago, is 8,200 feet high, but most of the mountains are less than half of this figure A number of good beaches are found throughout, especially on the North Coast The most important of these is Varadero about 80 miles from the City of Havana

Weather and Climate. Though the island lies wholly south of the Tropic of Cancer, it is near enough to the Temperate Zone to have a relatively moderate temperature the year around The summers may be hot at times but rarely as excessively hot as the maximums reported for cities in the southern part of the United States, 90° is not often exceeded, 80° is the

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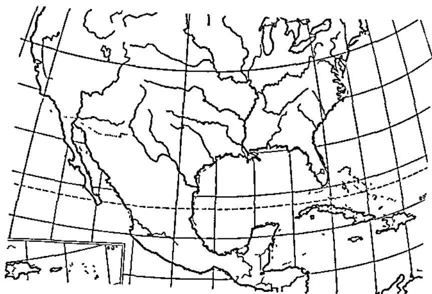
average maximum on the coast The winters are cool but not often cold, 40° is rare, 50° infrequent, with 60° to 68° the average minimum from November to March. Occasionally the thermometer reaches 80° or more during the winter.

Except on mountain summits, plant distribution is little influenced by temperature. It is the rainfall and soil that determine the natural vegetation. This practically reduces the traditional four seasons to two, the *wet or rainy season* and the *dry season*. The first commences about the middle of May and reaches until the end of October, the second from November until May. Both have their definite effects on the blossoming habits and other reproductive functions of plants. Thus Cuban plants have ample time to carry out their reproductive processes and have no need of doing it intensively, which accounts for the average small quantity of pollen in the air at any time of the year. The influence of humidity must also be considered. Our average figure of 75% may account for a considerable lack of buoyancy of pollen grains as compared with those in the dry air of cooler countries.

Social and Industrial Factors in Allergy. The island population of 5,500,000 people is largely concentrated in towns and cities, the largest of which is the Capital, Havana, with a population of more than 1,000,000 Santiago de Cuba and Camaguey each have a population of 150,000, Santa Clara 100,000. Most of the people live in towns ranging in population from 3,000 to 25,000 Others live in sugar cane or tobacco communities Cane and tobacco are the most important crops of the island and are those which make Cuba famous around the world Coffee and small crops are less important. The cattle industry is well developed, particularly in the central and eastern sections

Residences in cities and towns are built of brick with cement or tile floors and tile roofs, but most of the poorer farmers still live in primitive houses with walls made of palm tree wood and roofs of palm leaf thatch

A common custom is to spend the summer on the beaches, going out to the beaches daily or spending the week-end or



Parasites. Allergic reactions caused by intestinal parasites have been observed both in individuals and in groups. Ascaris, taenia, liver distoma and strongyloides have been found to produce at times the symptoms of tropical eosinophilia, a phenomenon which has been less commonly observed after infestation with trichocephalus, necator or the protozoa group. Most parasitic infestations in Cuba respond readily to adequate therapy.

Grass Pollen Grasses are the most important hay fever plants in the tropics They can be listed in a relative order of importance as Bermuda grass *(Cynodon dactylon)*, *Paspalum*, especially *P notatum*, *P dilatatum* and *P plicatum*, *Andropogon bicornis*, *Setaria lutescens*, *Sporobolus*, *Panicum*, *Tricholaena rosea*, *Eleusine indica* and *Chloris ciliata*. Sugar cane (*Saccharum officinalis*) is of little importance due to the fact that the cultivated cane varieties produce very little pollen and also because they are harvested before the flowers appear. Furthermore, it seems that sugar cane pollen is not allergenic. We have not found anyone clinically sensitive to it. Corn pollen is occasionally found on the slides exposed near corn plantations in the months of May, June, October and November. I have seen only one case of corn pollen sensitivity Except for Bermuda grass, the common hay fever grasses of the United States, timothy, bluegrass, orchard grass, velvet grass, low spear grass, redtop, sweet vernal grass and the fescues are not native, and are not cultivated, in Cuba

Ragweeds and Composites. Short ragweed *(Ambrosia elatior)* is widely distributed in the island, usually in the clay hills or in the suburbs of the city, but there is little of its pollen in the air anywhere Atmospheric tests in Havana have shown occasional ragweed pollen grains, and it is possible to catch some in the suburbs, particularly in the northwest and south sections. Pollination takes place almost any month of the year but most commonly through April, May and June *Iva cheiranthifolia*, our only marsh elder, is found in some humid areas on the coast Cocklebur *(Xanthium)* is considered a minor offender It pollinates from August to October Giant ragweed, southern ragweed and western ragweed are absent.

even a whole vacation on the shore. This minimizes the contact of household allergens during these months. A good proportion of allergy patients develop respiratory symptoms when north wind brings sudden changes of temperature in September and October, also in March and April.

Allergenic factors are much the same in Cuba as in the United States except for the important differences in kinds and quantities of wind-borne pollens. It thus follows that the incidence of allergy is about the same as in the U.S.A. except for the smaller number of pollen cases. House dust and molds, foods, animal danders and other inhalants are common Kapok has a more extensive use in the island than feathers. Allergy care is given to patients through specialists and physicians in general practice. They come for the most part from cities or small country communities and from farms where the standard of living is comparatively high. Hospital allergy departments give free care to charity patients

Food. North American and Cuban eating habits differ considerably In rural areas people eat rice, corn, potatoes, sweet potatoes, squash, beans, and Cuban vegetables, such as malanga, ñame and yuca, while spinach, beets and carrots are infrequently served Milk and milk products, eggs, chicken, pork, and seafood are readily available. Wheat is a standard food, but cereals are much more frequently eaten in the cities than in the small towns or on the farms

Fruits include avocados, guava, bananas, pineapples, and oranges Of seasonal fruits the mango, papaya, mamey, anon, guanabana, melon, and chirimoya are consumed in quantity (particularly the first three), but non-tropical fruits such as apples, pears, peaches and grapes are also popular.

Desserts rich in sugar occupy an important part in the diet. Concentrated coffee, a "demitasse," is offered between and after meals. Peanut oil and pork lard are preferred in cooking, but other oils such as olive oil and cotton seed oil are also used.

Cubans drink alcohol with moderation—chiefly beer—but on occasion, rum, brandy and whiskey. Non-alcoholic beverages enjoy wide distribution.

abundant in Pinar del Rio Province. Pine pollen, however, is almost if not entirely inactive allergenically. *Chlorophora tinctoria*, a tree of the mulberry family (*Moraceae*), produces some hay fever during the months of June to August in local areas. Its pollen is extremely allergenic, reacting on persons who are sensitive to mulberry (*Morus nigra*). *Mangifera indica*, the popular mango tree, although entomophilous, sheds pollen which occasionally has produced hay fever. The royal palm (*Roystonea regia*), also entomophilous, regularly sheds some pollen in the air which, though only slightly allergenic, can produce hay fever. The pollen of other palms, such as date palm (*Phoenix dactylifera*), is of less importance. All produce enormous quantities of pollen which is principally carried by insects The broad-leaved forest trees of Central and Eastern North America are almost entirely absent from the Island In very limited areas walnut, oak, pecan, willow, juniper and mulberry have been planted

Molds and Other Fungi. Molds are far more important than pollens The mold spore content of the air during the summer season is high The most conspicuous species are *Alternaria*, *Hormodendrum*, *Chaetomium*, *Monilia*, *Spondylocladium*, *Helminthosporium*, *Fusarium*, *Rhizopus nigricans*, *Acrothecium* *Mucor*, *Cephalotecium*, *Phoma*, *Cephalosporion*, *Spicaria*, *Nigrospora* and several species of *Penicillium* and *Aspergillus* There are also a variable number of spores of rusts and smuts The proximity of some cultivated areas to these organisms and also the infestation of some industrial residues have some influence People living in the outskirts of the cities and in the country have the greatest exposure to molds and other fungi.

It is common to find cases reacting simultaneously to other inhalants, especially to house dust If so, symptoms are, of course, perennial

Contact and Infectious Allergy. Contact dermatitis to plants, oils and saps is represented principally by "guao" dermatitis produced by several species of the *Comocladia* genera and some of the *Metopium* genera Mango sap is a relatively common dermal offender *Comocladia dentata* and *Metopium tox-*

There are no wind-pollinated composites such as the mugworts and sagebrushes. *Parthenium hysterophorus* is a very common weed. Though largely insect pollinated, it occasionally sheds a little pollen when weather conditions are favorable. The pollen is as active as that of the ragweeds and of other composites. Several shrubs are sources of moderate amounts of composite pollen, among them *Viguieria helianthoides* which blooms exclusively in December and January. Its pollen is, of course, essentially insect borne, but the plants are so abundant that the pollen reaches the air in sufficient concentration (140 grains per yd^3) to produce symptoms in living near the plants. It is a common observation that those who are sensitized to ragweed will also react to *Viguieria* pollen antigen. Some of the ragweed cases studied have developed clinical symptoms after contact with *Viguieria*. I am waiting for the next blooming of the plant to see if persons sensitive to ragweed who have never contacted *Viguieria* develop symptoms at the first strong exposure. The serum of *Viguieria*-ragweed patients contains very closely related reagins, and I have performed almost perfect passive transfer tests using either one of these antigens. *Baccharis halimifolia*, another composite shrub of the salt marshes, sheds some wind-blown pollen.

Miscellaneous Weeds. Pollens of various goosefoots and amaranths, *Chenopodium album*, *Amaranthus spinosus* and *A hibridus*, are found in the air, but hay fever cases due to these pollens are rare They are of very little importance The same can be said of common plantain *(Plantago major)*

Trees. The variety of trees in or near populous districts is small except for fruit trees planted near the city Native trees have largely been eliminated by sugar cane and tobacco plantations, as well as pasture lands. Trees bordering the streets are of little importance Australian pine *(Casuarina)* contributes more pollen to the air than any other tree. Most of its pollen is shed during the winter months, but some appears occasionally throughout the year. It was particularly abundant in September during the past season True pines *(Pinus)* are

abundant in Pinar del Rio Province. Pine pollen, however, is almost if not entirely inactive allergenically. *Chlorophora tinctoria*, a tree of the mulberry family *(Moraceae)*, produces some hay fever during the months of June to August in local areas. Its pollen is extremely allergenic, reacting on persons who are sensitive to mulberry *(Morus nigra)* *Mangifera indica*, the popular mango tree, although entomophilous, sheds pollen which occasionally has produced hay fever The royal palm *(Roystonea regia)*, also entomophilous, regularly sheds some pollen in the air which, though only slightly allergenic, can produce hay fever. The pollen of other palms, such as date palm *(Phoenix dactylifera)*, is of less importance. All produce enormous quantities of pollen which is principally carried by insects The broad-leaved forest trees of Central and Eastern North America are almost entirely absent from the Island. In very limited areas walnut, oak, pecan, willow, juniper and mulberry have been planted

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PART II
CENTRAL SECTION

Area	Author
15 Prairie Provinces of Canada	C H A. Walton, M D., F.A C P.
16 Minnesota	Fred W. Wittich, M D.
17. Michigan	George L. Waldbott, M.D.
18 Chicago Area	Samuel M Feinberg, M.D.
19 Iowa, Nebraska and the Dakotas	E L MacQuiddy, M D
20 Missouri	Stanley F. Hampton, M D
21 Kansas	Archibald J. Brier, M D.
22 Oklahoma	Johnny A. Blue, M.D.
23 Arkansas	Alan G Cazort, M D. and Thomas G. Johnston, M.D.
24 Louisiana and the Gulf Area	Vincent J Derbes, M D
25 Texas	J Harvey Black, M.D and L O Dutton, M D.

iferum are the most common offenders. The effect is similar to that caused by the *Rhus* group in the United States. *Rhus toxicodendron* does not exist in Cuba. Other plant sensitivities are of secondary importance. Infectious allergy is of secondary importance due to the fact that sunshine and outdoor life are helpful in preventing it.

15

Prairie Provinces of Canada

By C. H. A. Walton, M.D., F.A.C.P.

GEOGRAPHY. The 49th Parallel of North Latitude separates the North Central States of Minnesota, North Dakota and Montana from the three Canadian Provinces of Manitoba, Saskatchewan and Alberta. These Provinces are bounded on the north by the 60th Parallel, on the west by the Canadian Rockies and the Province of British Columbia, and on the east by the coniferous forests of Northwestern Ontario Geographically, Manitoba is not strictly a prairie region because only its southwestern eighth is grassland and the rest is made up mostly of large lakes, coniferous forests and the rocky terrain of the great Pre-Cambrian Shield surrounding Hudson Bay Manitoba is bounded in part by the southwestern shore of that Bay.

Saskatchewan is a true extension of the Great Plains and its southern two-thirds is typical prairie The eastern half of Alberta is grassland, but the western half is made up of foot hills and mountains

The Lake of the Woods and its tributary waters in western Ontario, north of Minnesota, drain by the rapidly-flowing Winnipeg River into the very large Lake Winnipeg, which in turn drains by the Nelson River into Hudson Bay The Red River of the North arises near the source of the Mississippi in Minnesota, runs north through the City of Winnipeg, there receiving a tributary from the west, the Assiniboine River, and goes on another 45 miles to empty into Lake Winnipeg. Saskatchewan and Alberta are drained largely by the North and South Saskatchewan Rivers, and their tributaries, into Lake Winnipegosis and thence into Lake Winnipeg

Climate. The climate of the Prairie Provinces is *comparable* with that of the North Central States but has a later *spring* and a shorter summer The winters are cold, dry and sunny.

The mean temperatures in January and February are close to zero but may vary 30° above and below that level The prevailing winds from November to February are north and west. During the summer months from June to September inclusive

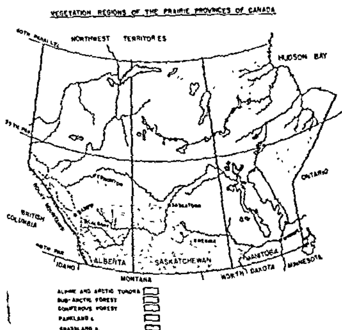
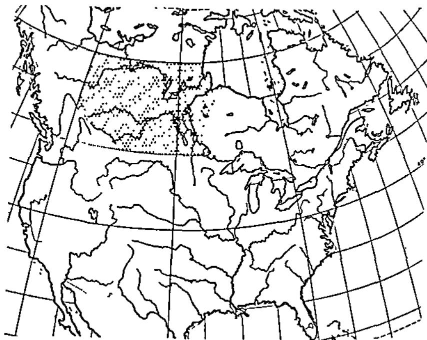


Fig 1

the prevailing wind is from the south Precipitation in the form of snow is relatively small, with the average snowfall from November 1 to March 31 being 8.4 inches per month The snow usually disappears by early April but occasional snowfalls may occur into May While May is a warm month with a mean temperature of about 52°, frost may occur briefly in that month June, July and August have respective mean temperatures of 62°, 67° and 64°, but with wide ranges of 30° higher or lower During these growing months, the mean precipitation



major producer of oil and natural gas. While Saskatchewan has a number of slowly developing resources, farming is its chief industry Winnipeg, the largest city in the Prairie Provinces (350,000), is an industrial and supply center, and most of the railways funnel through it In this respect it has been aptly described as the Canadian Chicago.

The populace has grown largely by immigration, and is about equally divided into those of Anglo-Saxon and those of Continental European origin. The latter number few of Latin, but many of Germanic, Slavic and Scandinavian descent. French-Canadians occupy a number of large communities. Canadian cities and towns, in style, customs and the amenities are not unlike comparable communities in the North Central States Schools are plentiful and in their general planning resemble the American ones Churches of all faiths are found.

Pollen The flora of the region is, of course, determined by such geographical considerations as described above, as well as by climate. The area east and north of Winnipeg soon becomes coniferous and has little allergenic importance This region is sparsely settled and is dotted with much mining activity and hydro-electric development South and west of the large Manitoba lakes is grass land and aspen grove It is a highly cultivated cereal growing country. Western Saskatchewan, especially in its southern part, is largely semi-arid grazing country, as is much of Alberta The latter Province has large coal and other mines and produces much oil and natural gas

From the point of view of pollinosis,[1, 2] the region is similar to the States it borders, with, of course, a later onset of tree pollination with each degree of North Latitude. Manitoba is the most heavily forested of the three provinces Usually late in April the willows and the poplars start to pollinate. The elms, which are particularly common in cities and towns, pollinate early in May and are followed by the ash, the Manitoba maple and finally the bur oak in late May. While April and May are usually warm months, frost may occur as late as the first week in June About this time the grasses start to bloom and pollination reaches its peak early in July. The more important grasses are timothy, the blue grasses, redtop and

ranges from 2.5 inches to 3.0 inches per month,* humidity is high for brief periods only, and there is usually a large amount of sunshine. September, as a rule, is a moderately warm bright month with a mean temperature of 54.3°. Killing frosts may occur at any time after Labour Day. Cooler weather obtains through October with occasional snow flurries and rain, but severe cold does not occur until November, and by the middle of that month the first permanent snow has generally arrived.

The above description of the Manitoba area applies generally to Saskatchewan and to Alberta. However, Alberta, and to a lesser degree Saskatchewan, have their winters greatly modified by periodic warm Chinook winds which cause rapid thaws and very wide swings in the temperature. Precipitation is less as one proceeds westward, and Southwestern Saskatchewan and much of Southern Alberta are semi-arid grazing country.

An additional climatic factor of importance is altitude. The elevation of Winnipeg is 766 feet above sea level; of Regina, 375 miles west, 1896 feet, of Calgary, 520 miles further west, 3438 feet, and of Banff, 4534 feet above sea level.

Fog is a rare occurrence on the prairies, and smog is unknown, even in the industrial areas.

Social Structure. Historically, Western Canada was a great fur trading area, and its great waterways provided communication through Hudson Bay with the outside world. With the development of the transcontinental railways in the late 1870's and 1880's, communication was established with Eastern Canada and by connecting links with railways of the American Northwest. Since then great agricultural development has occurred and farming is still a fundamental industry. The development of cheap and plentiful hydro-electric power in Manitoba brought many industries, and the later development of the large mineral resources of the Pre-Cambrian Shield in the Northeast and in the foothills of the Rockies led to further changes and population shifts. Recently Alberta has become a

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TABLE I

POLLEN RECORD FOR WINNIPEG, MANITOBA SEASON OF 1952

	Mar	*Apr.*	*May*	*June*	*July*	*Aug*	*Sept*	*Oct*	*Nov.*	*Tot*
Elm		629								629
Maple		230	13							243
Alder		13								13
Poplar		33								33
Hazel		22								22
Willow		21	27							48
Ash		84	2							86
Birch		10	4		2					16
Oak		3	142	6						151
Grass				22	64	22	4			112
Chenopodium				8	22	62	45	4		143
Nettle					19					19
Ragweed					58	490	115	1		667
Sage						6				6
Composite							4			4
Miscellaneous				2	3					5

occur early or late in September and terminates all pollination The ragweeds extend north from Minnesota and North Dakota and westerly into Saskatchewan, becoming less and less prevalent However, Russian thistle and the sages, which occur throughout the region in significant amounts, become increasingly important sources of air-borne pollen westerly into Alberta Tree and grass pollination is heavy, but weed pollen counts do not reach the levels found south of the border. However, although not as serious as they are in Minnesota, the weeds are important sources of clinical pollinosis and the prairies are not good weed pollen refuges except in the more northerly regions. Ragweed infestation, as is usual, has followed the opening of roads and the agricultural development of the prairies Each decade sees a marked rise in prevalence

and westward extent. Even parts of the Lake of the Woods area, such as Kenora, formerly free of weeds, are now troubled with ragweed.

Mold Spores. Mold spores[3] are found throughout the year in the area under discussion. The seasonal spores are those produced by *Alternaria*, *Hormodendrum* and *Helminthosporium*. These first appear early in April as the snow melts and the weather becomes warmer. They increase in amount, reaching a peak either in August or September or even in October, falling off rapidly with the severe weather of November and generally disappearing with the advent of snow later that month. In winters where snow is light and there is much bare ground exposed, some of these spores may be found even in the very coldest weather. There are many other spores occurring throughout the year. These include yeast cells, the spores of *Penicillium*, *Aspergillus*, *Monilia*, *Mucor* and *Rhizopus*. They are found in the air throughout the year and show little or no seasonal variation. They are common inside dwellings and other buildings and also in the open spaces. Both the perennial and seasonal spores have high counts and there is much clinical evidence of spore sensitivity throughout the prairies. The incidence in Manitoba appears to be higher than it is further west. The mold spore problem in this region is similar in amount and in type to that found in the Middle Western States and is quite similar to that found in Chicago, Northern Illinois, Wisconsin, Minnesota and Iowa.

Other Allergens. In addition to the spores and pollen of the prairie regions, there are other allergic factors of some importance. Because of the relatively long cool and cold seasons, house dust and other allergens peculiar to the interior of buildings are greater problems because buildings are closed up rather tightly for long periods of the year. This applies to both household dust as well as to farm and industrial dusts. As agriculture is a major industry of this region, the dusts that are peculiar to agriculture are of considerable allergic importance. Farmers are, of course, commonly sensitive to the dander of their various domestic animals and to grain dust. They are often mold spore sensitive also. Rust and smut spores, while

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Composite						4			4
Miscellaneous			2	3					5

occur early or late in September and terminates all pollination The ragweeds extend north from Minnesota and North Dakota and westerly into Saskatchewan, becoming less and less prevalent However, Russian thistle and the sages, which occur throughout the region in significant amounts, become increasingly important sources of air-borne pollen westerly into Alberta. Tree and grass pollination is heavy, but weed pollen counts do not reach the levels found south of the border. However, although not as serious as they are in Minnesota, the weeds are important sources of clinical pollinosis and the prairies are not good weed pollen refuges except in the more northerly regions. Ragweed infestation, as is usual, has followed the opening of roads and the agricultural development of the prairies. Each decade sees a marked rise in prevalence

and westward extent. Even parts of the Lake of the Woods area, such as Kenora, formerly free of weeds, are now troubled with ragweed.

Mold Spores. Mold spores[3] are found throughout the year in the area under discussion The seasonal spores are those produced by *Alternaria, Hormodendrum* and *Helminthosporium*. These first appear early in April as the snow melts and the weather becomes warmer They increase in amount, reaching a peak either in August or September or even in October, falling off rapidly with the severe weather of November and generally disappearing with the advent of snow later that month In winters where snow is light and there is much bare ground exposed, some of these spores may be found even in the very coldest weather There are many other spores occurring throughout the year These include yeast cells, the spores of *Penicillium, Aspergillus, Monilia, Mucor* and *Rhizopus* They are found in the air throughout the year and show little or no seasonal variation They are common inside dwellings and other buildings and also in the open spaces Both the perennial and seasonal spores have high counts and there is much clinical evidence of spore sensitivity throughout the prairies The incidence in Manitoba appears to be higher than it is further west The mold spore problem in this region is similar in amount and in type to that found in the Middle Western States and is quite similar to that found in Chicago, Northern Illinois, Wisconsin, Minnesota and Iowa

Other Allergens. In addition to the spores and pollen of the prairie regions, there are other allergic factors of some importance Because of the relatively long cool and cold seasons, house dust and other allergens peculiar to the interior of buildings are greater problems because buildings are closed up rather tightly for long periods of the year This applies to both household dust as well as to farm and industrial dusts As agriculture is a major industry of this region, the dusts that are peculiar to agriculture are of considerable allergic importance Farmers are, of course, commonly sensitive to the dander of their various domestic animals and to grain dust They are often mold spore sensitive also. Rust and smut spores, while

very prevalent, are not very common offenders, although a small proportion, perhaps not exceeding 15% of rural cases, are clinically sensitive to these allergens. Poultry is raised widely on farms as well as in special poultry establishments, and dusts from poultry houses as well as feather dust and feed dust are quite common allergic offenders. The most important cereal crops are wheat, oats and barley. These are delivered to grain elevators scattered throughout the region, and the dust from grain elevators and other storage places is often highly toxic to both the skin and the respiratory tract. With the advent of mechanical farm aids horses are less common than previously and horse dander sensitivity is becoming rare. There has been some talk of sensitivity to the dander of the deer. This is a rather rare occurrence and appears to parallel sensitivity to cattle dander.

Much industry is centered in the City of Winnipeg, which has many of the secondary type of industries including moderate sized steel plants, various manufacturers and a large textile and clothing industry. Since it is also the centre of the Canadian fur trade, raw fur markets as well as large fur manufacturing institutions are located here, and dust from this source is important Grain handlers, millers, fur, textile and other workers are, of course, common victims of dust from these industries. Mining is a major industry in the northern part of the country Gold, zinc, copper and other metals from hard rock are extensively mined, but, apart from the noxious fumes from the smelter plants in particular regions, the mining areas are remarkably free of allergic problems. The pulpwood industry is of some importance in the east, but is not important allergically The Caddis Fly occurs in large amounts along the swiftly-flowing Winnipeg River and has been known to be a serious allergic factor in employees in hydro-electric power houses

There is relatively little industry in Saskatchewan. In Alberta the packing industry and the raising of stock presents its own allergic hazards. The oil industry is developing widely in that province and, indeed, across the prairies, but has as

yet presented no special allergic difficulties. It is a common experience, because of the nearness of the forested rock country of the Pre-Cambrian Shield, for patients to move into the mining country and become immediately free of their previous troubles This is due to the absence of important vegetation and of animal and other common dusts.

SUMMARY

To summarize, tree-sensitive people will have more difficulty in the cities and towns and particularly in Manitoba, since deciduous trees are very sparse in Saskatchewan and in most of Alberta Tree pollination is very heavy but of short duration Grass-sensitive cases have a great deal of trouble throughout the region described, but the grass season seldom exceeds six weeks Ragweed victims achieve a relative improvement on moving into the Canadian prairies, but there is much ragweed pollinosis in Southern Manitoba and Southeastern Saskatchewan. The incidence of the growth of ragweed is increasing and is constantly moving west. Medicine Hat is the only Alberta area which has a significant ragweed count The chenopods and artemisias are prominent in Western Saskatchewan and in Alberta Spore sensitivity is exceedingly common and important throughout the prairies. Multiple sensitivities are usual, and the rural population in particular seems to suffer greatly from the common farm dusts. Ragweed dermatitis is quite common among the farmers in the eastern half of the prairie region and disappears when the farmer moves further west

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16

Minnesota

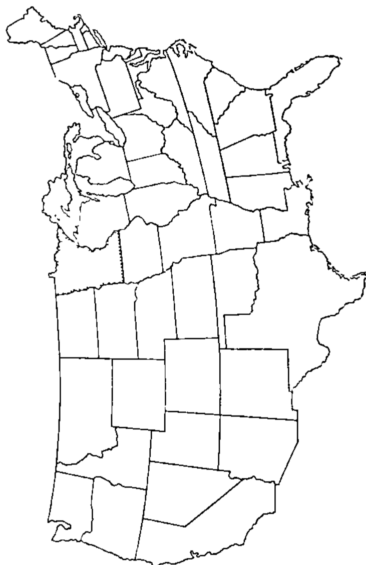
By Fred W. Wittich, M.D.

SOMEONE has facetiously said Minnesota has four climates—arctic, tropic, flood and drought. In spite of extreme variations in weather, climate, topography and soil conditions, the occurrence of the more common aerogenous allergens is on the average clearly defined.

Geography. Minnesota is about 400 miles long and averages 240 miles wide, 4,059 square miles are water surface An extensive height of land of about 2,200 feet in the north-central part determines the course of three great continental river systems The average elevation is 1,200 feet. The altitude drops below 800 feet in the valleys of the Red, Minnesota and Mississippi Rivers and along the shore of Lake Superior. Outside of certain forest reserves, the Mississippi and its tributaries drain the lower two-thirds of the State and flow through fertile narrow valleys, considerably below the general level of the prairies. Glacial action is responsible for the topography of the central and southern portions of the State, determining the direction and character of these rivers, making numerous swamps and its 10,000 lakes. The surface drift of glacial origin is a dark sandy loam of great fertility for cereal crops The east-central part of the State is sandy, excellent for hay and root crops Domestic and game birds and fur-bearing animals abound as a result of strict hunting seasons and game refuges

Climate. The state has a comparatively low mean annual temperature, however, the average annual range for Minneapolis and St Paul is 119° Cold increases from south to north and to some degree from east to west The amount of rain decreases from east to west, varying from 31 to 25 inches.

Social Structure. Scandinavians, Germans, Canadians and



Finnish are prevalent. The total population is about 3,000,000, of which half live in urban places or in villages of 2,500 or more. The number of occupied dwelling units is approximately the same as the number of families The white population forms about 99.2% of the total Taxes of all kinds are of the average. Educational facilities are unusually good, both public and parochial schools being excellent throughout the State. There are many consolidated schools of all grades and seven teachers' colleges, including the College of Education at the University of Minnesota The University has one of the largest enrollments in the United States There are nine privately supported colleges. The Division of Social Welfare has 14 county tuberculosis sanatoriums, and the administrative, federal and state laws provide many kinds of relief and safeguards for the interests of children There is a Division of Employment and Security, and 19 state charitable and corrective institutions Minnesota is pre-eminently an agricultural state, agriculture and livestock are the greatest sources of income, except for mining and lumbering, which are also extensive in the northern part of the State Manufacturing is varied and extensive In the order of importance, come the meat slaughtering and packing industry, grain and feed mills, flour milling, manufacture of dairy products, printing and publishing, bakery products, pulp and paper, and other industries too numerous to mention Electric light and power is developed to a high degree Transportation, both by land and water, is exceptionally well provided

List of Allergenic Factors. The frequent sudden changes in temperature, particularly in the spring, together with melting snows, are conducive to respiratory infections which frequently aggravate chronic asthma of the infectious type Artificial heat is required alternately or continuously about eight months of the year Furnaces burning oil distillate or gas are predominantly used, supplemented by electric heaters and occasionally range oil burners About 5% of the asthmatic patients complain that the fumes from burning oil distillates aggravate their respiratory allergies. The major allergenic factor in Min-

nesota during the cold months is house dust and its various components. The house dust season from September to May is the most prominent factor in perennial respiratory allergies. School dust is another important factor during these months. The symptoms of patients, both juvenile and adult, moving to Minnesota from the extreme south frequently indicate increased sensitivity to dusts Air conditioning is being rapidly developed, but frequently an asthmatic patient's symptoms are aggravated by it The Twin Cities (Minneapolis and St. Paul) and their suburbs, comprising over 1,000,000 people, are the site of many and varied industrial plants responsible for air pollution causing respiratory allergies. Minneapolis is the center where the vast crops of cereal grains and cultivated grasses of the state are focused for inspection and manufactured into flour or stock feeds When discussing allergenic factors, the possibility of the effects of chemical air pollution must also be included in the Twin Cities and Duluth-Superior industrial centers By and large, organic dusts are the major offenders. Actually, the organic materials, disseminated as fumes and particulate matter from the manufacture of linseed oil, paper products, malt, paint, mattresses, house insulation material, flour-aging agents, stock feeds and soy bean products, as well as dusts from feed mills, flour mills, seed mills, or fur storage, or where there is storage or handling of grain, are common causes of allergies in this area, lumber mills, meat packing plants and insecticides should be included in this list.

According to Prof E. C Stakman, Head of the Division of Plant Pathology and Botany in the University of Minnesota Department of Agriculture, the corn smut in certain areas during the season of 1935 reached 1,000,000 spores per square foot in 24 hours. Heald stated that spores of the stinking smuts or bunts of wheat may be numerous in mill dust, as a single smutted wheat kernel may contain 6,000,000 to 9,000,000 spores The heads of wheat blossom in Minnesota usually from June 22 to June 27, and the head appears ripe after that, so that the harvesting time for this winter grain is between July 17 and July 23 At this time the infected or smutted heads

commence to throw off the black smut spores in countless numbers. The spores are widely disseminated by the high, dry winds which are quite common.

Smuts appear in large amounts near the grain storage centers in Minneapolis. The various grains are shipped near the city and samples sent for inspection About the grain exchange more than 3,000 workers are engaged in inspecting, sorting and conveying the grains, while thousands of workers are employed in the flour mills and grain elevators. Disastrous mill dust explosions have occurred. Most of the buildings are old and contain a great deal of mill dust and many molds Smut spores are extremely combustible when beaten up into a dust because of their oily nature Contact dermatitis is seen, as well as the atopic forms of skin allergy, perennial rhinitis and asthma, not only among those handling the grains but among those employed in nearby offices Slides exposed for 24 hours inside the offices within six blocks of the grain exchange showed numerous grain smuts, rusts and other molds.

During late June and early July the loose smuts of winter wheat, barley, oats and grasses are in the air. The harvesting periods of August and early September free the stinking smuts or bunts of spring wheat. After late July the corn smut appears. In the fall, when the corn is stacked and allowed to stand in the fields, the large smut balls are broken up and disseminated so that the corn smut spores are found in large numbers until snowfall A survey made in 1937 showed a corn smut shower of 96,000 spores per square centimeter of surface area during a high west wind following several killing frosts

Smuts, therefore, appear in large numbers during and between the grass and weed pollinating seasons They predominate numerically over the common air molds appearing at the same time. It would seem that they are responsible in part at least, as well as the common air molds, for some of the symptoms of hay fever and asthma occurring between and after the pollen seasons and for otherwise unaccountable exacerbations during the pollen seasons

Professor Stakman and I reported the first case of respiratory allergy (asthma) due to inhalation of grain smuts in 1937.

Since that time 24% of the patients in a large allergy clinic in Minneapolis have been found to have respiratory allergies mainly due to sensitivity to grain smuts. This was proved by exposure, withdrawal and subsequent exposure. Minneapolis

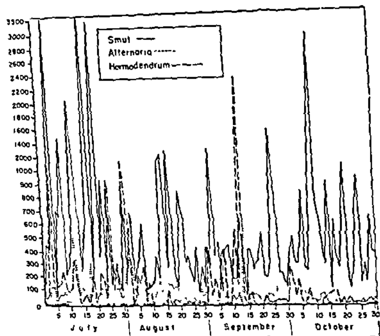


Fig. 1 The smut spore count compared with that of *Hormodendrum* and *Alternaria* from July 1 to October 31, 1938, at Anoka, Minnesota Note. The small black marks across the bottom of the chart indicate days of rain.

has 14 large flour mills, 17 feed mills (cutting condemned moldy grain for cattle consumption), seven seed mills and 40 separate elevator nests within the city limits Most of the dusts from cleaning these grains are brought into the atmosphere through successful ventilation, so that during those days when the elevators are being unloaded of grain and the grain manufactured into flour, respiratory allergies, particularly asthma, are greatly increased. Among the patients are

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Among furriers asthma is common Whether the chemical commonly used for dying furs—*paraphenylenediamine*—is the offender is controversial

The hunting grounds of Northern Minnesota abound in deer. Respiratory allergies among hunters to deer hair are

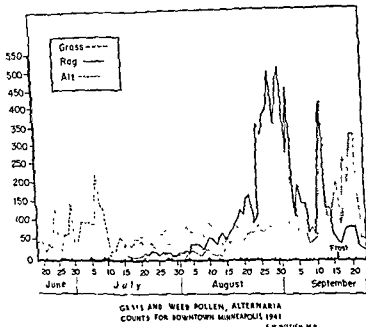


Fig 2 Note The small black marks across the bottom of the chart indicates days of rain

common. The northern summer resorts usually have stuffed deer heads in their reception quarters, and allergic patients going north to escape pollen hay fever may develop symptoms from a potent allergen in deer and cattle hair.

Baker's asthma may be caused by *ammonium persulfate* added to flour *Chlorine* gas, used in aging flour, has produced asthma in some workers exposed to faulty or leaky apparatus.

Wood stains containing *isoamyl alcohol* have produced asthma in carpenters

clerks and stenographers in the loop district in Minneapolis, which is only eight blocks from the milling district These smuts are found, by every conceivable study conducted by me, including nitrogen determinations, immunologic studies and experimental production in animals, to be wholly or partially responsible for respiratory allergies in the Northwest area. This report covers a systematic, long-range survey, which has been made for the past 17 years by me, of the common atmospheric mold fungi, smuts, rust and other allergens infesting the grains, and grain and feed mill dusts, including insects

Specific offending allergenic agents, known as *haptens,* consist of conjugated proteins which result from the combination of proteins and numerous chemical substances. In allergic persons sensitive to these chemical-protein combinations, symptoms may develop after exposure to a conjugate when they are not affected by either the chemical or the protein in the conjugate, alone.

Likewise, numerous insecticides in common use have been shown to have allergenic specificity because of the chemicals employed with them. These conditions arise largely in areas where attempts are made to control plant infestation. Insecticide commonly used in this area is parathion *(o,o-diethyl-o-para-nitrophenyl thiophosphate),* a relatively new organic phosphate. DDT *(2,2-bis[parachlorophenyl]-1,1,1-trichloroethane)* has also been used extensively in various concentrations ranging from 4 to 34% DDT. Combination dusts of *DDT* and *tetraethylpyrophosphate* have been used extensively in both ground and plane application, as well as *benzine hexachloride.*

All the aforementioned materials are irritating to the respiratory system, especially in the concentrated forms used They may aggravate or initiate an attack of asthma, rhinitis, or an eczematous dermatitis of the contact type, as a nonspecific irritant acting as a "trigger" mechanism or as a specific chemical allergen Asthmatic attacks are not infrequently attributed to *paradichlorobenzene, naphthalene* and *camphor* contained in other insecticides.

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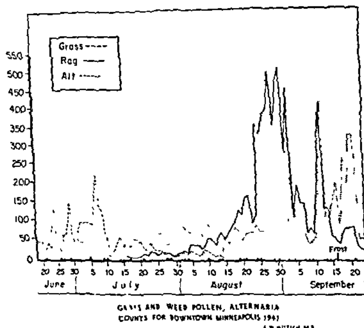


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the atmospheric molds are a definitely proved cause of respiratory allergies. The average incidence of *Alternaria* is about twice that of ragweed pollen, and in the southern and central portions of the State the incidence of *Hormodendrum* exceeds that of *Alternaria* during the months of August, September and October Cultural mold surveys were made in Minneapolis under the auspices of the American Society for Mycological Investigation, and in general it was found that the incidence of *Alternaria* was an index of the proportionate incidence of all the other atmospheric molds

TABLE I

POLLEN RECORD FOR MINNEAPOLIS, MINNESOTA, 1950

	May	*June*	*July*	*Aug*	*Sept*	*Oct*	*Total*
Maple	315						315
Oak	875	130					1005
Birch	416	13					429
Elm	1986	12					1998
Ash	86	4					90
Poplar	17						17
Walnut	12	13					25
Willow	24						24
Pine		80	7				87
Basswood			4				4
Mulberry			6				6
Grass		342	220	94	46	2	704
Sweet clover		28	12				40
Nettle		57	275	133	76		541
Chenopod-Amaranth			22	266	186	13	487
Hemp			12	102	3		117
Ragweed			25	4525	4183	58	8791
Sage-wormwood			38	88	92	8	226
Sunflower				4	6		10

Figure 2 shows, per 1 8 sq cm., a rather representative average fall of grass pollen and ragweed pollen compared with that of *Alternaria*. Rainfall is indicated by small triangles July is a particularly bad month for patients sensitive to molds. For years the hay fever seasons have been clearly defined in Minnesota which makes it easier for the treatment of patients.

Figure 3 represents the incidence of pollens causing hay fe-

Some sheet steel mills in this area use flaxseed to prevent the sheets from sticking together when hot. *Acrolein* is produced, which has caused asthma in at least three allergic patients.

The exact nature of the allergenic components of these or-

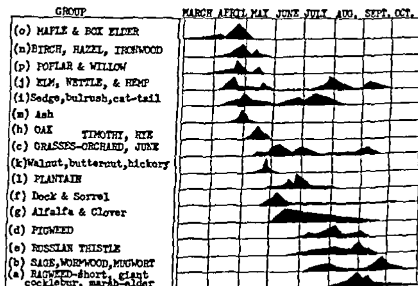


Fig 3

ganic dusts requires clarification and a long-range program of chemical and protein studies. Many of these antigens are composed of complex proteins of high molecular weights, while the active antigen in ragweed pollen has been shown to have complex *polypeptides* From the standpoint of pure science it may be desirable to determine what chemical factors in this linkage with proteins are responsible This is of academic interest rather than of practical clinical value, since it is the complex combination which is responsible for the symptoms in the allergic patient. This conclusion is based on individual investigations, which included consultations with botanists, plant pathologists, physiologists, immunologists and chemists.

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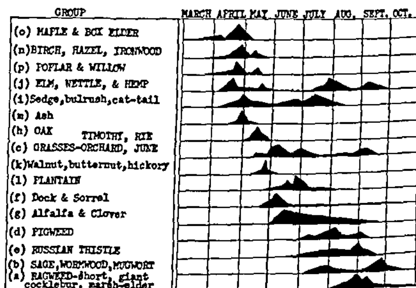


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17

Michigan

By G. L. Waldbott, M.D.

GEOGRAPHY. The State of Michigan is made up of two Peninsulas, a smaller one in the north and a much larger one in the south The Northern Peninsula structurally belongs to the Laurantian uplands of Canada In this area, ranges of hills border the Lake Michigan shoreline and that of Lake Superior, mountains are found farther inland, ranging up to 2,000 feet in height The Southern Peninsula lies within the central lowlands of the United States. Its topography conforms to that of the surrounding prairie regions It is characterized by a generally flat surface which is but slightly elevated above the Great Lakes On flying over this area, one is impressed by the chains of low hills alternating with the large number of small lakes and swamps which originated when the continental ice sheet receded slowly from this region The greater part of this Peninsula slopes westward and is drained into Lake Michigan by a number of small rivers The mean elevation of the entire state is 900 feet Most of Michigan's industry is concentrated in the southern portion of the State near the natural waterways and the railroad trunk lines Agriculture prospers in the southern and central areas while the northern portion of the State consists mainly of forest land.

Climate. Because of the presence of large bodies of water, the Great Lakes, the many inland lakes and small waterways, the climate is somewhat more temperate than the more Westerly Central States The mean annual temperature is 48° at Detroit in Southern Michigan, 41° at Marquette in the Northern Peninsula The mean temperature at Detroit for January, is 24 1°, for July 71°, at Marquette, 15.9° for January, 63 6° for July The average annual precipitation is fairly uniform

ver in Minnesota, determined by a long-range survey made by Rosendahl and Ellis at the University of Minnesota. There are 16 pollen groups in the State causing hay fever. The Botany Department of the University of Minnesota makes official counts of hay fever pollens each fall, and these counts are published in the *Minneapolis Star* for the information of patients and physicians.

Table 1 on the preceding page lists the monthly incidence of the pollens of trees, grass and weeds from May 1 to October 5, 1950. I am grateful to Miss Agnes Hansen, Assistant Scientist and Instructor, Department of Botany, University of Minnesota, for these official counts.

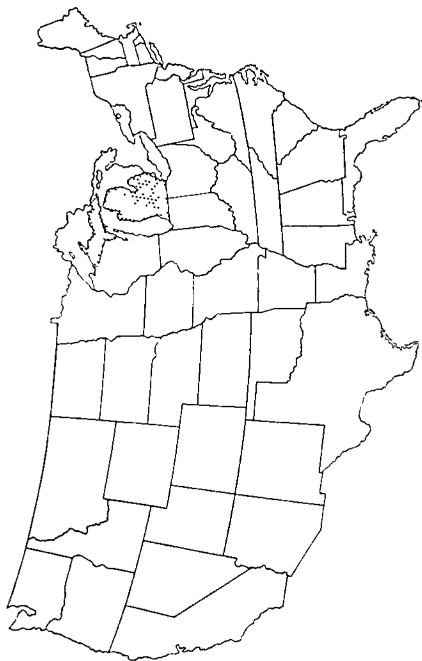
It was found that during this season practically no pollen was caught on exposed slides during the month of April or after October 5 The figures in this report are expressed in the volumetric unit of measurement, that is, the number of pollen grains per cubic yard of air, which were estimated from the counts made on the standard gravity slides, 24 hours' exposure.

Duluth and the north shore of Lake Superior were considered for years a haven for hay-fever sufferers. This impression as far as Duluth is concerned was a result of local propaganda, because for many years there definitely have been ragweed pollens in significant numbers in the Duluth Area. In many places in the Arrowhead country ragweed concentrations are still low.

with 31 inches for the State. The average dates for the last killing frosts in spring are April 24 for Detroit, May 10 for Alpena. In autumn, the dates for the first killing frost are October 18 in Detroit and October 7 in Alpena. The average growing season at these points lasts 177 days and 150 days respectively. The average moisture content of the air in Michigan is 71.5

In relating this statistical data to our problem, the following facts stand out. Michigan has hot summers and cold winters. Like other states in this latitude, it is subject to sudden changes from warm to cold and vice versa. In the Southern Peninsula, moisture enhances the discomfort of cold and hot weather. Humidity and the long duration of the growing season are responsible for an abundance of molds and pollen. A large percentage of the population, therefore, suffer from what is called here "the Michigan weather," namely, chronic upper respiratory infections, especially chronic sinus disease. This contrasts sharply with the situation in the northern part of the State where the growing season is shorter, the air much dryer and clearer and, therefore, upper respiratory diseases are less prevalent. In the southern part of the State, another important problem prevails, namely, the contamination of the air by various kinds of dusts and fumes, emanating to a large extent from industrial establishments.

Soot. Upon exposing slides for pollen studies in the Detroit Area, coal particles or soot are often present in such quantities that it is actually impossible to make adequate pollen counts. On damp and foggy days, in periods of atmospheric stability, these particles remain suspended in the air, darken the atmosphere, impede visibility and cover the exposed skin with a film of "dirt." On such days, many more patients invariably visit the allergist's office than on others. After a freshly fallen snow, we can observe within a radius of 50 miles of Detroit, accumulations of fine black precipitate on the surface of the snow, which is most pronounced in the center of large cities, less in outlying districts. The principal sources of soot are the many factories in Southern Michigan, the exhaust



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from automobiles in a state with highways and congested traffic. Coal dust is further derived from the very active shipping industry on the Great Lakes and on the rivers and straits, connecting the lakes with each other. Carbon is chemically inert and not irritating to the healthy respiratory mucosa; yet in patients susceptible to respiratory ailments, it causes much irritation on diseased mucous membranes and aggravation of existing symptoms. Furthermore, it might be a carrier of bacteria and fungi, especially in damp weather.

Other Contaminants. There are many other contaminants in the air which are more difficult to identify and to control They are organic and inorganic chemicals, gaseous and complex substances of vegetable or animal origin. On many occasions asthmatic patients develop severe attacks while passing through certain areas in an automobile plant No information is available at present to indicate the sources of these attacks. Some regions in the industrial part of Michigan are conspicuous by the gaseous odors and the chemical dusts which emanate from them. In addition to the automobile and accessory plants in Detroit and Southern Michigan, there are foundries, steel plants, power plants, pharmaceutical plants, a large rubber plant, an artificial rubber plant near Port Huron, a large chemical plant in the central part of Michigan, many cement plants in the northern part of the State. There are very extensive chemical industries southwest of Detroit which have in recent years expanded tremendously in size. In the same region, there are several large oil refineries. In all districts where such plants are located, contamination of the air is noticeable and sometimes it extends for many miles

A comprehensive study of air pollution by the United States Public Health Service, in conjunction with the Canadian government is underway Although not yet completed, it has already brought forth some interesting and useful data This study consists of sampling the air, and analysis of the contaminants by chemical and physical methods I am greatly indebted to Dr. W. G Fredrick for information regarding this study. *Beryllium* has been noted near manufacturing plants,

where copper alloys are processed. This metal is known to cause pulmonary granulomatosis with marked dyspnea, cyanosis, cough, club finger; symptoms which resemble asthma. Whether or not its concentration in the air in certain areas is sufficiently high to cause danger has not yet been ascertained. Other air contaminants are iron oxide, manganese oxide and sulphur trioxide which are found near foundries. Among other inorganic elements, cobalt calcium, zinc, lead, magnesium, molybdenum, manganese and tin are constituents of dust in and near factories Among gaseous contaminations sulphur dioxide and sulphur trioxide are probably most prevalent Aldehydes are present in the exhaust of tail pipes of automobiles It is assumed that rubber particles from car tires may be a factor in air contamination, especially in large cities where there is much traffic Another chemical which may be of significance is vanadium dust which has its origin in a fuel oil imported from Venezuela, and is being used in Michigan in increasing amounts This whole problem is extremely complex and the information now available is only fragmentary The present research will undoubtedly lead, within a short time, to adequate control of air pollution Indeed, many improvements have already been made through the cooperation of industry with public health officials

More complex organic dusts, products of fermentation and putrification emanate from packing houses, from grain bins, bakeries, food processing plants, manure piles on farms, etc. This constitutes a minor problem in Michigan because these emanations are confined to relatively small areas. At certain times of the year, smoke from forest fires is blown in from the northern section of the United States and from Canada This may create rather severe symptoms in allergic patients for a limited time. On several occasions, in recent years, dust storms originating in other Midwestern and Southwestern States accounted for discomfort among patients with respiratory allergy

Homes and their Surroundings. The patient's home and its immediate surrounding may play a great part in his well being Like other metropolitan areas, the large cities in

Michigan have slum areas with old buildings, moldy and damp wooden structures, poor drainage, inadequate garbage disposal and infestation of rats. They alternate with modern and air conditioned dwellings which are kept free from dust and dampness by modern appliances. Slum clearing projects

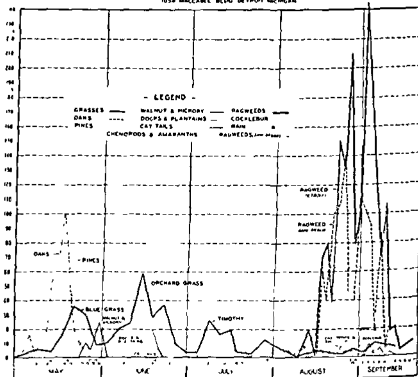


Fig 1

are being carried out on a large scale in Detroit and other Michigan cities, which will especially benefit the patient of the poorer class. There are numerous new housing developments in Detroit consisting of small, but well built and dry units. In the northern part of the State, homes are generally more primitive In selecting a home, its immediate surroundings should be carefully scrutinized, especially with respect to moisture in basement and woodwork and to "low spots"

Pollen. The pollen situation in Michigan closely parallels that of the surrounding territory bordering the Great Lakes. The principal prevailing pollens and the dates of their appearance in the area are shown in Figure 1. Ragweed, the most important wind-borne pollen, is somewhat less prevalent in the northern part of the Lower Peninsula and is practically absent from much of the Upper Peninsula. Northern Michigan would, therefore, be a satisfactory refuge for hay fever sufferers of the Midwestern States if it were not for the adjacent weedy areas of Central Wisconsin and Michigan. Actually there is no community in the Upper Peninsula where ragweed sensitive patients are not subject to occasional showers of pollen blown in by southerly winds. In recent years ragweed has invaded roadsides and gardens in some of the wooded areas of the Upper Peninsula which had formerly been free from ragweed. These incursions are believed to be due to transmission of ragweed seeds on automobile tires, incident to the extensive automobile traffic in late fall.

Second in importance of Michigan hay fever plants are grass pollens. There seems to be an increase in the number of patients sensitive to grasses which can perhaps be explained by the increasing change to grassland at the expense of corn and other grain. In addition to the grasses noted on the graph, sweet vernal grass should be mentioned which causes some symptoms about the beginning of June, among the trees, elm pollen in mid April, maple in early May.

Fungi. The growth of fungous spores, is largely dependent on the moisture in the air. Their concentration in the air varies from year to year and day to day and even from one location to another. In our survey carried out in 1937, plates were exposed during the whole year in three different stations sixty miles apart. The peaks of fungous concentration in these stations were not nearly as uniform as the pollen peaks. Nevertheless, a seasonal tendency could be determined for *Alternaria* from June to frost, this is significant because of the great antigenicity of this fungus. It was noted that *Penicillium* is in the air throughout the whole year and is probably the most abundantly growing fungus in this area. In subsequent

studies, we noted peaks of *Hormodendrum*, smut and rust in midsummer. We found smut and rust are of much greater

DISTRIBUTION of MOLD SPORES IN DETROIT 1937-38

Each curve represents the count of an individual mold during one entire year

Fig 2

importance in inducing allergic symptoms than is generally realized. Rust may be the so-called "factor X" causing severe hay fever in early summer, which has been subject to a great deal of speculation among allergists in the South. Rust can-

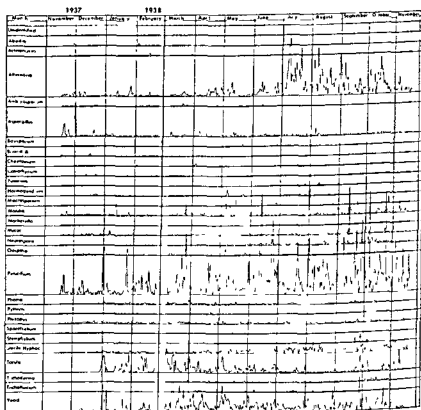
not be cultivated on plates; in one season it appears in great abundance while the following season it may be practically absent. *Torula* and yeast are noted in higher concentration in late winter and early spring when the snow melts.

SUMMARY

In summarizing our experience on regional allergy in Michigan, it should be emphasized that Michigan is one of the states with a high pollen concentration, considerable fungous growth and in certain areas, especially the industrial southern parts, contamination of the air by soot and other chemical agents. In the north, the situation is much more favorable, the area is nearly free from ragweed, the air is much clearer. Here, trees and grasses are major factors in early spring and summer, bacterial infections and housedust in winter.

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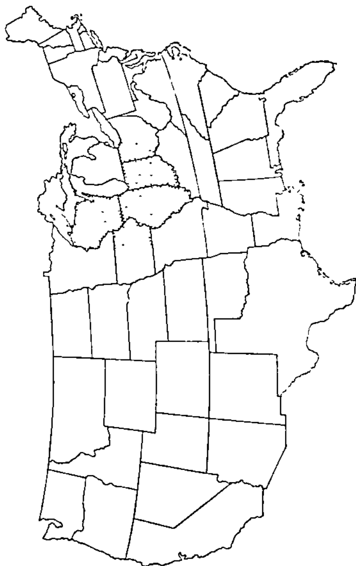
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18

Chicago Region

By SAMUEL M. FEINBERG, M.D.

FOR THE purpose of this discussion the "Chicago Region" may be defined as that area including Illinois, Indiana, Wisconsin, parts of Ohio and Iowa.

The Geography of this area has general characteristics. It is essentially flat country, with rolling hills here and there. With the exception of Louisiana and Delaware, Illinois is the most level state in the Union The soil is fertile and well irrigated and much of the land is cultivated. There are numerous wooded areas and in Northern Wisconsin particularly large forested tracts have been preserved. Hundreds of lakes are intermingled with the wooded areas in this northern section. Bordering on the east of Wisconsin and part of Illinois is Lake Michigan, one of the largest lakes in the world and responsible for the modification of weather trends for part of that area Large cities are present, among which are Chicago, Milwaukee, Indianapolis, Peoria, Springfield, and Gary

The Climate of the area as a whole is temperate, but there is considerable difference between conditions in various portions. The average maximum summer temperature ranges from 70° to 80° and the average minimum winter temperature from 20° to 0°. A few days during the summer the maximum temperature may reach 90° or even higher, while several days during the winter the temperature drops to below zero, and has been as low as −20°. In the southernmost part of this area the maximum summer temperatures may reach 100°, while in northern Wisconsin minimum winter temperatures of −30° or lower are not uncommon The cold winter air is responsible for much of the aggravation of asthma during that season. The excessively dry air in heated homes is another

also have their nasal symptoms aggravated by these atmospheric changes. To some extent such weather conditions also have an effect on other seasonal and nonseasonal respiratory allergy

Man-made atmospheric conditions contribute to the "climate," particularly in the cities. It is well known that the industrial wastes which contaminate the atmosphere are frequently irritating to the respiratory tract. Products of coal combustion are especially harmful. To what extent these substances are specifically allergenic or chemically and physically irritating is not well defined at present. Pending further investigation we may regard most of these waste products as nonspecifically irritating As examples we have the soft coal smoke of the train yards; the general sooty haze in such industrial cities as Chicago, Indianapolis and Milwaukee, the oily, gaseous contaminants in the oil refining areas around East Chicago and the pungent odors around the paper mills in northern Wisconsin These irritants are factors in aggravating respiratory allergy as well as other respiratory conditions It is not uncommon to see an asthmatic who feels perfectly well in Wheaton (a western suburb of Chicago) have asthma by the time he arrives in the Chicago loop. It is understandable why some cases of asthma or vasomotor rhinitis will improve by going away to far distant places Many of them, however, would do as well by moving into a suburb or into the country not far from the city

Social Structure. The "Chicago area" is prosperous and unemployment is at a low level Wisconsin is both an agricultural as well as an industrial state. Dairying is the main agricultural occupation, although many crops such as corn, oats, hay, peas, wheat and tobacco are raised. Iron mining is an important industry in the Lake Superior region while lumber and wood products are important in the northern part of the State Illinois is an industrial rather than agricultural state, yet it is second only to Iowa in agricultural importance. The important crop is corn Important industries are slaughtering and packing, iron and steel manufacture, agricultural imple-

factor. The area as a whole is fairly humid, the greatest humidity being noted in the river bed regions and around Lake Michigan. Relative humidities of 70 to 95% are not uncommon in the summer. Rainfall is abundant, the average yearly precipitation being about 35 to 43 inches. Snow is likely to cover the ground part of the time from December to sometime in March, with a longer period in the northern and a shorter in the southern portions of the area. The prevailing winds vary in different parts of the territory At Cairo, Illinois, they are southerly during all months except February, and as far north as Springfield (Illinois) they are southerly from April to January. Through most of the territory winds are mainly from the west or northwest, except along the shores of Lake Michigan where they vary from northeast to southwest.

The effect of Lake Michigan on the climate of that region deserves special comment The tempering influence of the Lake may have a profound effect on the temperature. For example, it is not rare to find on a hot summer's day that the temperature in Chicago near the lake is 10° to 15° lower than it is 10 miles away. In winter, the Lake may also act as a tempering influence. Lake Michigan is also responsible for some of the increased humidity and fog encountered not infrequently in Chicago, Milwaukee and similar localities. It is also responsible for sudden weather changes such as a drop of 40° in 24 hours, which in many instances cannot be predicted. This unpredictability is epitomized in the common quip in the form of advice given to the Chicago visitor: "If you don't like the weather, wait a minute!" This influence on the weather may have a significant effect on seasonal allergy in that area. For example, a ragweed season which is expected to be severe because of heavy growth of the weeds may turn out to be very mild if for a period of 10 to 12 days during the critical stage of the season cool north winds or lake winds prevail.

Rainy spells with sudden temperature drops are likely to occur during the ragweed season. It is particularly during these periods when pollen counts are at their lowest that asthmatic phases of pollinosis are precipitated. Some sufferers

hay fever and asthma being more severe than the average ragweed case. Since grass pollen is heavier than the pollen of ragweed the amount in the atmosphere is more likely to be affected by its local environment, hence the grass pollen counts in the country are much greater than in the city.

Ragweed pollination begins throughout the area about the first week in August and usually terminates during the latter part of September. Farther north the season ends with the advent of 40° to 50° temperatures, farther south it may last into October. The most important ragweeds in the whole area are the giant *(Ambrosia trifida)* and common ragweed *(Ambrosia elatior)*. In some sections, such as in Chicago and vicinity, burweed marsh elder *(Iva xanthifolia)* is also profuse, but the amount of pollen it produces is relatively small. Cocklebur *(Xanthium)* is also of minor importance for similar reasons. The prevalence of ragweeds varies somewhat within parts of this area Regions around Peoria, Indianapolis, Madison (Wisconsin) and Southern Illinois are the most heavily infested. The Chicago and Milwaukee areas are also bad, but have the advantage of the influence of lake winds There is relatively little ragweed in the northernmost parts of Wisconsin, although southerly or southeasterly winds may bring considerable pollen to that area on some days. The Eagle River, Minocqua and Hayward areas, which used to be favorite hay fever resorts many years ago, are no longer as effective because of the clearing of land and the extension of farming. The ragweed family is probably second in importance as a cause of plant dermatitis, poison ivy ranking first.

Other plants may produce pollinosis in this section. Beginning somewhat before the ragweed season and continuing with the latter, pollination of chenopods and amaranths occurs. Among these are the Russian thistle *(Salsola pestifer)*, lamb's quarters *(Chenopodium album)*, pigweed *(Amaranthus retroflexus)* and Mexican firebush *(Kochia scoparia)*. In restricted areas Mexican firebush has become a dominant weed, even replacing ragweed. In a very few sandy locations Russian thistle makes a fair show, but the total of all pollens of the

ments, oil production and petroleum refining. Indiana also is of agricultural importance. Its main industries are iron and steel and motor vehicle production. The area as a whole has a fortunate balance of city and farm folk, industry and agriculture, and laboring and professional elements. The school systems are good and provide elementary education to all. There are many colleges and professional schools and there are eight medical schools, five of which are in Chicago. Each one of the medical schools has an allergy clinic and most of them have well organized allergy departments with teaching given to undergraduates, and in some cases graduates. By means of courses, county society programs and other organized medical groups the allergists have done a fairly good job in educating the practitioners in the smaller communities to appreciate allergy and to manage at least the simpler cases. The organized charities make it possible for underprivileged people to obtain specialized help. It is now possible for virtually all allergy sufferers in this area, urban or rural, and rich or poor, to obtain competent help.

The Pollen problem is much the same throughout this area. The tree season begins about the first of April, much earlier in the southern part and a little later in the northern area, and terminates about the end of May. In the northern section, birch and aspen are important, in the southern and central portions, oaks and elms are most important. Other trees which may cause symptoms are maple, poplar, ash, walnut, hickory, pecan and sycamore Tree hay fever is the least severe type in most instances.

The grass pollen season occurs roughly from the middle of May to the middle of July, earlier in the southern portion, later in the northern, with some stray grass pollen found all through the late summer. There are numerous species of grasses, although the largest pollen producers are the Kentucky bluegrass, Canada bluegrass, timothy, orchard and red top grass Grass pollinosis is more frequent and usually more severe than tree pollinosis, but much less important than ragweed hay fever. However, exceptions do occur, some cases of grass

respiratory allergy. The incidence of mold spores in the atmosphere in large cities is sufficient to cause respiratory allergy in many people, although the rural districts, and special environments such as threshing, hay loft, hay rides, and circus enclosures may increase the intensity of exposure considerably. Sometimes occupational exposures, such as handling of grain or potatoes, may constitute a special factor.

TABLE II

Spore Counts in "Chicago Area"
Average Totals for Season

	Alternaria	*Hormodendrum*
Chicago	3,240	5,000
Indianapolis	13,000	13,000
Milwaukee	4 000	4,000
Madison (Wisconsin)	7,000	20,000
Streator (Illinois)	10,000	11,000

Although mold spores are never absent from the atmosphere, significant numbers of those which commonly cause allergy are most likely to be present from April to November. Fluctuations during the season are frequent and extensive, depending not only on the evolution of the crops of vegetation on which the molds grow but also on the weather changes. To some extent the mold spore and pollen incidence are dependent on the same factors, such as preliminary rains, warmth for generation, and dryness and wind for distribution However, unlike pollen, molds do not require sunshine. The molds most commonly grown on air-exposed plates in this area are *Alternaria* or *Hormodendrum*, the two together constituting 72% of all such culturable fungi. About 12% of the colonies are *Penicillia* The *Alternaria* appear to be the most important allergenically. In addition to the above, fungi of possible importance are smuts, yeasts, and perhaps several others

There are a number of patients in this area whose history and observation fulfill all requirements for mold allergy and

chenopods and amaranths of the area is small and their role in inhalant allergy practically negligible anywhere east of the Mississippi River. English plantain *(Plantago lanceolata)* is common in some localities in this general area. It is barely possible that this weed has not been given sufficient attention

TABLE I

Average Pollen Counts for Different Plants are about as Follows

Trees (all species)	
(city) Maximal	100
Total for season	1000
For local exposure (oak trees in yard, etc) it may be several thousand.	
Grasses	
(city) Maximal	50
Total for season	500
Chenopod-Amaranths	
Maximal	15
Total for season	100
Ragweeds—	
Chicago	
Maximal	563
Total for season	5896
Peoria, Ill	
Maximal	1090
Total for season	12,000
Eagle River, Wis	
Maximal	112
Total for season	800

as a cause of hay fever here. It reaches anethesis about June 1, continues maximum production for six weeks and where cut down repeatedly may still be found producing in small amount in September

Mold Allergy is common in this region This is to be expected from the fact that the fungi most important in the causation of respiratory allergy are the type which thrive on grains and grasses and do best in well irrigated areas Dampness alone is not sufficient to favor the growth of this type of mold; hence, the forested areas of Northern Wisconsin have much less of mold allergy In the area as a whole fungi are only second to pollen in the incidence and importance of

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Northern Prairies and Plains (Iowa, Nebraska and the Dakotas)

By E. L. MacQuiddy, M.D.

WITHIN these four states of the Upper Missouri River Basin live five and a quarter million people, mostly engaged in agriculture, cattle raising or the processing and transport of products of the farm and ranches. Half of the population of the whole area is found in Iowa where the per capita wealth is the greatest—and probably the most equitably distributed—of any state in the union. This can be easily appreciated when it is noted that all but 3% of Iowa land is under cultivation and that 25% of all of the Grade A soil in the United States is found within its borders. The two large metropolitan centers are Omaha, Nebraska, with 360,000 people, and Des Moines, Iowa, with 225,000. A little less than 60% of Iowa people live in the country. In Nebraska the proportion is slightly higher. In South Dakota 76% of the population is rural and in North Dakota fully 80%.

The allergy problems of various parts of this north central area are generally similar in character to those areas of corresponding longitude of Kansas, Oklahoma and Texas. The foods eaten by people of the Dakotas, Nebraska and Iowa differ only slightly from those eaten in other rural midwestern sections or even in the eastern metropolitan areas. Contact allergens differ markedly from those of the more or less forested sections, and air-borne inhalants differ both in character and quantity from those of Appalachian and Atlantic Seaboard areas, as well as those from the Mountain States and West Coast. A consideration of the factors involved in the production and dispersal of air-borne allergens is pertinent to

yet no positive skin or mucous membrane tests can be elicited with the fungi available. There are also other patients who give positive skin tests to fungi, but whose course makes it suspicious that not all of their mold allergy has been diagnosed. It is conceivable that a missing link in our knowledge of mold allergy or in the individual diagnosis is the fact that some fungi are highly specialized or parasitic and that there is difficulty in the procurement of representative specimens with which to test patients.

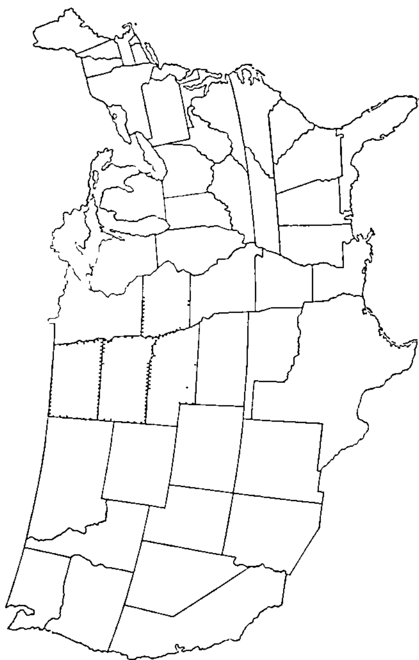
In this area, *house dust* is a common factor in respiratory allergy. It is rather characteristic of the house dust cases that the symptoms are more troublesome in the winter, and sometimes confined entirely to that season of the year. Allergy to May fly occurs occasionally in this area, particularly in the Great Lakes region Other inhalants do not differ much from their customary importance.

Sinus and bronchial infections are rather common in the Great Lakes area, due to changeable temperatures, strong winds and high humidity Such infections not infrequently result in asthma. Usually it will start as a winter asthma, which frequently becomes year-round later.

a presentation of the results of the surveys which have been made within the area.

Topography. The eastern edge of the Dakotas and Nebraska and the whole of Iowa are made up of gently rolling terrain, consisting mostly of loess upland and valleys, at elevations ranging from 500 to more than 1,500 feet. Much of this land is well adapted to agriculture and is intensively cultivated A definite change in the topography takes place in the eastern parts of the Dakotas and Nebraska where, as one proceeds westward, the land gradually becomes more level, less productive, sometimes excessively alkaline, and in the western part often badly eroded. This wide treeless area, now called the Great Plains, was in the early days known as the Great American Desert. It includes all of North Dakota except a strip of rich Red River Valley land about 30 miles wide along the Eastern State Line. In South Dakota the Great Plains area begins at about the James River and terminates in the Badlands and the Black Hills with elevations exceeding 5,000 feet The Badlands also extend into Northwestern Nebraska, but the outstanding feature of Nebraska topography is the large sand hills area occupying the north central part of the State. These hills are not very high and are not shifting dunes at the present time, being covered with wild grasses suitable for hay and grazing In fact, most of the Great Plains area is more suitable for stock raising than farming

Weather and Climate. The climate of the Great Plains is decidedly of the continental type with moderate to high temperatures in the summer, often low temperatures in the winter and sudden changes at any time of the year. Extreme all-time records for North Dakota, for example, range from -54° to 110°, while those for Iowa range from -47° to 118°. In Southeastern Nebraska and Iowa there are five months or more of frost free growing weather, in Northern North Dakota only a little more than three months Iowa is in the belt of adequate rainfall—30 to 35 inches per year, with most of the precipitation during the spring and summer months. Westward from the 96th Meridian (Iowa-Nebraska line) the average annual



(*Buchloe dactyloides*) and grama grass (*Bouteloua gracilis*). In fact, the area was often referred to as the "short grass country." Except for the native trees, there were very few heavy producing wind-pollinated species anywhere in the prairies and plains. The wild grasses shed only meager amounts of pollen, likewise the sages (*Artemisia*). Ragweeds of several genera and species were present but were unable to compete with the native grasses except in a few river bottom situations. Bluegrass, timothy and Russian thistle had not been heard of. Whether pollen allergy existed among the Sioux tribes is not a matter of record, but we are sure that the air carried fewer kinds of pollen and a far lighter load of both pollens and spores than it does today.

Our present weed population is anything but static. Noticeable changes may occur in the course of a few years or even in a single season. Not too long ago our "dust bowl" area suffered several years of severe drought. It was the opinion of those who were giving study to the situation that Russian thistle became the dominant farmland weed over most of the Great Plains during that period. During the last few years, with considerably more moisture, Russian thistle incidence has certainly subsided, but other chenopods, together with the amaranths and perhaps the ragweeds, have seemed to increase

Changing agricultural practices invariably produce changes in the weed flora. Buffalo grass all but disappeared with the breaking of the virgin sod for grain growing, and weed seed were planted with the wheat. Weed control, which now receives national recognition, is still in its infancy in the Midwest

We are just now learning that 2,4-D may be of great value in destroying the weeds responsible for hay fever. In this largely agricultural region, however, attention is centered on the weeds which affect our crops rather than on those which affect the comfort and health of human beings. During the last few years in which mechanization of the farm has taken place and farm manpower decreased, numerous home sites,

rainfall diminishes progressively and rapidly until it reaches an average of 17 inches per year in Western North Dakota. However, these average amounts cannot be depended upon. During the last half century the Great Plains has experienced not only single seasons of scant rainfall but several prolonged drought periods of several years extent. Dry farming is always a gamble in the Great Plains, more so in its drier, western edge, but this phase of agriculture is slowly changing due to the numerous Federal Reclamation Projects. Dams are being built, or at least projected, at intervals along the Missouri River, also on the Republican and North Platte Rivers, with the definite intent of conserving more water for irrigation.

Wind velocities are often high, particularly in the spring and fall. The strong winds have a very direct effect on the crops and on weed populations, not only in the distribution of certain types of seeds, but in rapid evaporation of moisture from the soil. They contribute to allergy in the wide dispersal of pollens and mold spores.

Agriculture and Other Industries. Iowa has earned its title of the Corn State by producing considerably more corn than any other state or any other equivalent area in the world. One-half of its farm acreage is devoted to corn. The remainder is used for wheat, oats and a wide variety of other farm crops and for animal husbandry Nebraska and South Dakota are winter wheat States but much corn is also grown in the eastern parts. North Dakota devotes as much acreage as possible to spring wheat but depends heavily on cattle. Obviously animal epidermals, the pollens of native and cultivated plants, as well as the ubiquitous farm weeds and soil molds, account for a formidable array of widely disseminated inhalant allergens. Mining and manufacturing have fewer allergenic hazards.

Flora. In the days of the Indian and buffalo the uplands of the rolling prairies were covered with tall native grasses and the lowlands with a variety of hardwood trees. The Great Plains then had almost no trees at all but were completely carpeted with a dense growth of short grass, mostly buffalo grass

(*Buchloe dactyloides*) and grama grass (*Bouteloua gracilis*). In fact, the area was often referred to as the "short grass country." Except for the native trees, there were very few heavy producing wind-pollinated species anywhere in the prairies and plains The wild grasses shed only meager amounts of pollen, likewise the sages (*Artemisia*) Ragweeds of several genera and species were present but were unable to compete with the native grasses except in a few river bottom situations Bluegrass, timothy and Russian thistle had not been heard of. Whether pollen allergy existed among the Sioux tribes is not a matter of record, but we are sure that the air carried fewer kinds of pollen and a far lighter load of both pollens and spores than it does today.

Our present weed population is anything but static. Noticeable changes may occur in the course of a few years or even in a single season Not too long ago our "dust bowl" area suffered several years of severe drought It was the opinion of those who were giving study to the situation that Russian thistle became the dominant farmland weed over most of the *Great Plains* during that period. During the last few years, with considerably more moisture, Russian thistle incidence has certainly subsided, but other chenopods, together with the amaranths and perhaps the ragweeds, have seemed to increase

Changing agricultural practices invariably produce changes in the weed flora Buffalo grass all but disappeared with the breaking of the virgin sod for grain growing, and weed seed were planted with the wheat Weed control, which now receives national recognition, is still in its infancy in the Midwest

We are just now learning that 2,4-D may be of great value in destroying the weeds responsible for hay fever. In this largely agricultural region, however, attention is centered on the weeds which affect our crops rather than on those which affect the comfort and health of human beings. During the last few years in which mechanization of the farm has taken place and farm manpower decreased, numerous home sites,

barnyards, odd plots of land unsuitable for large-scale farming and considerable areas of marginal land unsuited to any sort of farming, have been abandoned to the weeds and wild grasses. Altogether a surprisingly large percentage of the land area of the prairies and plains still holds out a tempting invitation to any weed vagrant or immigrant.

Introduced Weeds. Three outstanding instances of weed introductions are worthy of notice. Russian thistle *(Salsola pestifer)* was first. The seeds of this pernicious wind-pollinated plant were accidentally introduced into South Dakota in 1873 with flaxseed imported from Russia. The dry alkaline soil when broken for wheat farming was an ideal culture medium for Russian thistle. From the original local infestation it spread in all directions as fast as the high winds of autumn and early spring could roll the dry, seed-laden tumbleweeds across the unobstructed plains. For 50 years Russian thistle was the undisputed champion of all agricultural pests of the drier parts of the Great Plains.

Then came burning bush *(Kochia scoparia)*, a Russian thistle relative which is fully as hardy and even more adaptable to variations of soil and climate. In the early 1920's, burning bush was a comparatively rare weed in the Midwest, but the picture changed rapidly. Entering Nebraska from Central Colorado about 25 years ago and establishing a focus in Lincoln County, within 15 years this new tumbleweed spread like wildfire across the plains and even onto the prairies. From Iowa eastward to Detroit it is confined mostly to waste areas in cities and towns. In the Great Plains it has greatly reduced the acreage of Russian thistle and is a keen competitor of the ragweeds in some more moist locations.

Another example of weed invasion on a smaller scale is furnished by hemp *(Cannabis sativa)* which was introduced about 1890 into Eastern Nebraska incident to production of hemp fiber for the manufacture of rope The soil and climate in the vicinity of Fremont, Nebraska (and perhaps other communities), were evidently ideal, for even when hemp culture was discontinued the plants were still able to survive and

even to flourish in both cultivated and waste areas. In this instance the spread was more gradual than that of the tumbleweeds, and the final range has been more restricted because hemp does not prosper in alkaline soil. In its favorite habitat —moist fields, pastures, roadsides, waste places—it encounters a number of worthy competitors such as giant ragweed, burweed marsh elder and western water hemp

Pollen and Fungus Spore Seasons. Seasonal inhalant allergy symptoms usually begin by the latter part of March in Nebraska and Iowa—some three weeks later in North Dakota —and continue until freezing weather Hay fever in the early spring months due to the pollen of trees is not too common since tree pollens are comparatively rare sensitizers and because the tree population of the plains is limited to the banks of streams and plantings for shade, shelter and ornament. Tree pollens disappear from the air by the end of May. Late spring hay fever caused by the pollens of the various wild and cultivated grasses is noticed, if at all, during the period of late May to mid July, except in the rare instance of corn pollen sensitization which occurs in July and August. The seasonal mold spore allergens appear in June and increase in volume throughout the summer

In late June allergy symptoms are somewhat augmented by the pollens of the early goosefoots and amaranths. Distress from this type of allergens increases markedly, particularly in Nebraska and the Dakotas, in July when Russian thistle and related offenders such as burning bush and the water hemps reach maturity. Hemp (*Cannabis*) is also a local factor in the Central Missouri River Valley at this time, but the maximum of suffering throughout the region is not reached until after the 15th of August when ragweed pollen production gets under way Respiratory distress due to the molds continues until the latter part of October, long after the weeds are dead and their pollens have disappeared from the air. Thus it is possible for a hay fever victim with multiple pollen and fungus spore sensitivity to experience difficulty during August and September from four distinct types of major of-

barnyards, odd plots of land unsuitable for large-scale farming and considerable areas of marginal land unsuited to any sort of farming, have been abandoned to the weeds and wild grasses. Altogether a surprisingly large percentage of the land area of the prairies and plains still holds out a tempting invitation to any weed vagrant or immigrant.

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very low in the dry farming areas. Atmospheric tests at Rapid City, South Dakota, in June and July have averaged less than one grain of grass pollen per cubic yard of air per day. Grass pollens have been practically absent from the air during early July in North Platte and Scottsbluff, Nebraska, and in middle South Dakota. Of all of the wild grasses of the plains country, western wheat grass (*Agropyron smithii*), otherwise known as bluestem, and crested wheat grass (*A. cristatum*), are the most widely distributed and the best producers. Smooth brome grass (Bromus inermis) has been introduced for forage and roadside planting. Its productive ability is probably less than that of the wheat grasses.

Except for corn and rye, the farm cereals do not produce much pollen. In fact, they are negligible sources of grass pollen. Rye and corn pollens, particularly the latter, are very heavy and consequently are never carried very far from their source. Hybridizers regard 200 feet as a safe distance to prevent cross fertilization with corn pollen. Testing with corn and rye pollens is therefore indicated only in the case of persons directly exposed. Rye pollinates in early summer, corn in August and September.

Routine testing for pollen sensitiveness in late May, June and July in Iowa and the eastern parts of the Dakotas and Nebraska should be carried out with bluegrass, timothy, orchard grass and redtop pollens, in the Great Plains States with at least bluegrass, timothy and western wheat grass, supplemented by such other local native and cultivated grasses as can be obtained.

Goosefoot-Amaranth Group. Russian thistle and burning bush, though not confined to the states here considered, are outstanding local sources of inhalant allergy in a large part of the region. They must be considered together, not only because of their close botanic relationship in the goosefoot family (*Chenopodiaceae*), but particularly because of the similar antigenic quality of their pollens. Both plants are annual, globe-shaped, tumbleweeds with inconspicuous blossoms that produce pollen in small amounts as compared with the rag-

fenders—goosefoot, ragweed, hemp and molds. Theoretically he could have trouble over a period of seven months. Fortunately, however, such cases are rare, most of the suffering occurring during the summer and fall.

DISTRIBUTION AND EVALUATION OF SPECIES

Trees. Natural woodland is non-existent in North Dakota except in the Turtle Mountains along the Canadian border. Here a small area (1% of the State's total area) boasts aspen, balsam, poplar and birch in abundance. Until the shelter belts were started in the 1930's, tree plantings in the Great Plains was confined almost exclusively to elm, box elder, ash and cottonwood, named here in the order of their blossoming dates. Elm is the most important of the four as a source of active pollen Willows are present along some streams but unimportant in allergy. The pollen contribution of the shelter belt trees has not been assessed. Bur oaks are common in the Black Hills, also some aspen and birch.

In the more moist areas of our region, a good variety of native trees is found and successful plantings are numerous. Elm, box elder, ash, cottonwood and sycamore are very common. Numerous species of oak are found in Southern Iowa, several of which occur throughout the State, and several of which are found in the extreme southeast tip of Nebraska. Oaks are outstanding in pollen production in their range, but the allergenic quality of their pollen is not too high. Black walnut is common and butternut occasional along the larger streams in Iowa and Eastern Nebraska Several species of hickory reach as far west as the southeast corner of Nebraska, but there are none in the Great Plains.

Grasses. The meadow grasses, particularly bluegrass and timothy, which are so common in the northeastern quarter of the United States, reach their western limit at the west edge of the prairie region—eastern quarter of the Dakotas and Nebraska. No wild or pasture hay grasses of the central and western parts of these states approaches bluegrass or timothy in ability to produce pollen. So grass pollen concentrations are

quality to that of Russian thistle, it is evidently not as active. Proof of its low sensitizing ability is the lack of victims in areas where it is abundant and where Russian thistle is absent. In the better soil of South Dakota, when rainfall is adequate, pigweed (*Amaranthus retroflexus*) is an extremely common farm weed. But none of the true amaranths of the northern prairie or Great Plains States are even moderate producers of wind-borne pollen.

Hemp (*Cannabis sativa*). This plant, whose presence in this area has already been accounted for, is in no way related to water hemp The present range, which is evidently not increasing, includes the bottom lands of the watershed of the Missouri River in eastern Nebraska and the west edge and south half of Iowa, together with the adjacent corners of South Dakota, Minnesota, Missouri and Kansas. It is significant that this is the only area in the United States where appreciable air pollution with hemp pollen has been reported. Since hemp pollen allergy is our own unique problem, the guilty plant deserves special attention in this paper. Already on the public enemy list because of its narcotic drug known as marihuana, it is pertinent to say for the plant that the drug is found in the leaves and small stems and not in the pollen, also that the drug content of wild midwestern hemp is much less than in plants grown in Mexico, the Southwest and the Orient

Hemp is a coarse, strongly aromatic annual, seven to 12 feet high with palmate leaves and unisexual flowers—male and female on separate plants. As in the case with western water hemp and most other dioecious plants, the pollen is strictly wind-borne and is produced in large quantities. Air contamination from this source in Omaha has during some seasons been as much as 15% of the total ragweed figure The allergic response to hemp pollen is specific since the allergen is entirely unlike that of any other common offender. Severe hay fever is often followed by a severe type of bronchial asthma. The season of pollen dispersal is from late July to early September.

weeds or even with hemp. But the marked allergenic activity of Russian thistle pollen more than compensates for its lack in quantity. In its active area it affects a greater per cent of the local population than is affected by ragweed even in the center of the ragweed belt. How long after 1873 before the pioneer wheat farmers became sensitized to Russian thistle pollen is not known. Specific sensitization to burning bush pollen has been difficult to recognize because of the frequent cross reactions between the two pollens as exhibited in skin testing and because both pollens are encountered during the same season. Twenty-five years ago only occasional reactions to burning bush could be elicited even on Russian thistle victims. Now it seems that the pollen is a slow acting and somewhat independent sensitizer with a lesser degree of activity than Russian thistle.

Russian thistle is a dry land weed thriving with less moisture and on more alkaline soil than almost any other weed. It is particularly adapted to land where the native grasses have been destroyed—often found in wheat fields, particularly in South Dakota and Nebraska. It is seldom found in the Red River Valley, except during the very driest seasons, and is not a factor in Iowa or the adjacent portions of South Dakota and Nebraska.

Burning bush is a much more conspicuous weed than Russian thistle and may invade fields. It is most persistent in towns and cities and on marginal land and railroad right-of-ways In such places it is common even in Iowa and farther east.

In the amaranth family the water hemps *(Acnida)* are outstanding pollen sources in the farmlands of Iowa, Southeastern South Dakota and Eastern Nebraska They are not adapted to dry soil but often invade cornfields. The two species, western water hemp *(A. tamariscina)* and rough-fruited water hemp *(A. tuberculata)*, are very similar in appearance as well as productive ability Both are found in various parts of Iowa but only the former in Nebraska and South Dakota. While these plants produce a type of pollen similar in allergenic

Dakota and doubtless in other parts of Western North and South Dakota. Dragon sage (*A dracunculoides*) and prairie sage (*A ludoviciana*) are widely scattered but of academic interest only. Atmospheric studies have revealed small amounts of sage pollen in August and September in extreme western South Dakota and Nebraska, though not enough to more than slightly supplement the effect of ragweed pollen, to which it is closely related botanically and antigenically.

Other Composites. The only composites other than the sages that could be suspected as local causes of inhalant allergy are the sunflowers (*Helianthus spp*) which are extremely common just east of the Missouri River in South Dakota and in some parts of Midwestern Nebraska. In very dry weather it is possible that farmers may be exposed to the pollen of these weeds

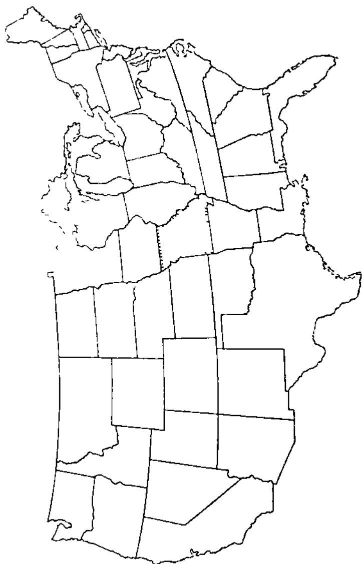
The Fungi. In all of the agricultural parts of our area fungus spore production is heavy, especially in the wheat belt. Rust and smut spores, though low in antigenicity, are, nevertheless, potential sources of trouble in harvesting and milling occupations *Alternaria*, *Hormodendrum* and *Fusarium* require no better culture media than are furnished by the straw of small grain The spores of these and similar seasonal molds are abundant in the air from late June to freezing weather and can be contacted at any time of year by those engaged in handling straw, hay or stored grain Environmental molds, such as *Penicillium*, *Aspergillus*, *Monilia* and *Mucor*, are also often present in barns and homes. Skin testing should include both seasonal and environmental types.

English plantain *(Plantago lanceolata).* This common weed of all bluegrass lawns, found also in clover fields and waste areas throughout Iowa and the adjacent parts of Nebraska and South Dakota, is a moderate producer of air-borne pollen but a rare specific offender in allergy. The pollen is distributed in June and July.

The Ragweed Family *(Ambrosiaceae).* Short ragweed *(Ambrosia elatior)* is the principal source of ragweed pollen in Iowa and the better watered soils of Nebraska and the Dakotas, including the Red River Valley. It flourishes in waste places, along roadsides and in most fields of wheat and other small grain. Giant ragweed *(A. trifida)* is present throughout the four States but is confined to the richest, most moist bottom land. Pollen production is heavy where the weeds are abundant. Western ragweed *(A. psilostachya),* originally common throughout in virgin soil, is now common only in parts of the Great Plains and even there is not an important factor in pollen pollution of the air.

Burweed marsh elder *(Iva xanthifolia),* otherwise known as prairie ragweed, is conspicuous in most parts of Iowa and all over the Great Plains. It can usually be found wherever burning bush is present but needs more moisture than western ragweed. In many places in South Dakota and Nebraska it is the dominant ragweed, though seldom troublesome in cultivated fields. Poverty weed *(I. axillaris)* is present only in alkaline soils of the extreme western parts of the Dakotas The false ragweeds *(Franseria),* while present in very limited amounts in the western edge of the Great Plains, are not important factors anywhere in the area. Cockleburs *(Xanthium spp.)* are very common cornfield weeds, but their production of pollen is decidedly low

The Sages *(Artemisia).* All species have been practically eliminated from the intensively farmed areas, but they are still present in the virgin soil of most parts of the Great Plains True sagebrush *(A tridentata)* is found only in the extreme western parts of the Dakotas. Pasture sage *(A. frigida)* is fairly conspicuous just west of the Red River Valley in North



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Missouri

By Stanley F. Hampton, M.D.

THE State of Missouri lying on the west bank of the Mississippi is buttressed by four typical northern states and by an equal number of typical southern states. It is thus both north and south in its location, climate, natural flora and agricultural products, as well as many of its political and social aspects. As a good example, one may need only refer to the fact that Northern Missouri is well within the corn belt, yet its annual yield of cotton in a few counties in the extreme southeast corner exceeds that of Florida, Virginia or Kentucky.

Roughly half of Missouri's 4,000,000 people (6% colored) are rural while more than two-thirds of the urban half live in or adjacent to its two chief cities, St. Louis and Kansas City, the former on the extreme eastern edge of the State having twice the population of the latter on the opposite side. Literacy is high. The Missouri educational system includes 54 institutions of higher learning, including five universities and numerous colleges. Washington University and St. Louis University, both in St. Louis, offer four year medical courses.

Diversified farming and fruit raising with attendant animal husbandry, the processing of grain, meats and other animal products, with mining and lumbering, account for a large variety of widely distributed allergen hazards These include both inhalant and contact types, such as chemicals, dusts, danders, pollens and fungus spores. Smoke and chemical fumes are distinct health hazards in the transportation industrial centers, as is rock dust in the mines and quarries, but such substances are seldom primarily allergenic.

Physical Features. For the purposes of this discussion the

of heat and cold, and occasionally of over-abundant rainfall or prolonged drought. In Boone County in the center of the State, all-time records show a maximum temperature of 111° and a minimum of -26°. The average length of the growing season ranges between 170 and 180 days—about six months from killing frost to killing frost. But this is not the limit of the season of distribution of pollens and the spores of fungi which in all last eight months. The average annual rainfall in the northwest corner of the state is about 30 inches In the southeast corner there are small areas that average 50 inches. The climate of Missouri, in general, is humid. The early morning mean relative humidity in St. Louis has been over 70% since records have been kept.

Flora. Formerly the State was heavily wooded with a great variety of broadleaved trees except on some of the uplands on the northern and western parts. Excellent hardwood lumber, and in the southeast section from pine, cypress and cedar, was plentiful But the timber has long since disappeared from almost all tillable land leaving only small wood lots and fringes along the streams in the prairie region. Lumbering is no longer one of the principal industries. Weeds were, of course, imported by the pioneers and encouraged by the destruction of native flora, but grasses have replaced the trees where they have had opportunity The pernicious exotic weeds of the Great Plains have not invaded the farmlands of Missouri, but one of them, firebush, is now plentiful in Kansas City and St Louis Even the two extensive summer resort regions, the Lake of the Ozarks area in the central part of the State and the White River area along the Arkansas border, are beset with their share of the state-wide pollen hazards

Trees. Of the trees and shrubs listed on Table I, all of which are capable of causing inhalant allergy, only a few are outstanding state-wide sources of air-borne pollen Elm, the earliest of this group, is notable for its productivity and for the activity of its pollen. Because elms are widely used for shade, the pollen is shed in centers of population rather than

state may be divided into three distinct topographic areas: (1) two extensive regions of undulating prairie in the northern end and western side of the State, (2) the Mississippi Lowlands embracing six counties in the extreme southeast corner, and (3) the Missouri portion of the Ozark uplift lying between the prairie and the lowlands. The southern boundary of the prairie region follows the southern rim of the Missouri River Valley westward from the River's mouth to about the center of the State, then swerves irregularly southwestward to the corner of the State. Water covers 680 square miles of the state's area, including the sprawling octopus-shaped Lake of the Ozarks, considered to be the largest artificial lake in the world, with a length of 129 miles and a shoreline of 1,300 miles, formed by the impounding of the Osage River by the Bagnell Dam.

The whole prairie region, varying in altitude from 500 to 1,200 feet, is a succession of fertile valleys and uplands given almost entirely to diversified farming and animal husbandry. The valleys of the smaller streams vary from one to 10 miles in width and fall below the upland in some cases as much as 300 feet. The Missouri Valley itself drops as much as 600 feet below the level of its bluff contours and varies in width from five to 60 miles

The Mississippi lowlands are really low—below the dikes of the Mississippi River in some places, and averaging only 400 feet above sea level as a whole. The soil, where drainage is adequate, is very rich and gives unusual yields of farm products

In the Ozark highlands elevations range up to more than 1,800 feet. In many places the terrain is too rough and stony for full-scale farming but is adapted to small valley acreages devoted to grains and row crops, to fruit, livestock and poultry raising This is a region of limestone and granite, of swift streams, gushing springs and caves

Weather and Climate. In general, the climate in Missouri is moderate so that adequate rainfall supports native vegetation and cultivated crops But there are frequent extremes

Orchard grass (*Dactylis glomerata*)					x	xxxx						
Redtop (*Agrostis alba*)						xxxx	x					
Timothy (*Phleum pratense*)						xxxx	xxx					
Fescue (*Festuca elatior*)						xxxx	xxx					
Ryegrass (*Lolium perenne*)					x	xxxx						
Canada bluegrass (*Poa compressa*)						xx	x					
Quack Grass (*Agropyron repens*)							xxx					
Lamb's quarters (*Chenopodium album*)						xx	xxxx	xxxx	xxxx			
Burning bush (*Kochia scoparia*)							xxxx	xxxx	xxxx			
Pigweed (*Amaranthus retroflexus*)							xxxx	xxxx				
Spiny amaranth (*Amaranthus spinosus*)							xx	xxxx				
Russian thistle (*Salsola pestifer*)							xx	xxxx				
Western water hemp (*Acnida tamariscina*)							xx	xxxx				
Hemp (*Cannabis sativa*)							xx	xxxx				
Sunflower (*Helianthus annuus*)							xx	xxxx	xxxx			
Ragweed, giant (*Ambrosia trifida*)								xxxx	xxxx	xx		
Ragweed, short (*Ambrosia elatior*)								xxx	xxxx	xx		
Ragweed, southern (*Ambrosia bidentata*)								xx	xx			
Cocklebur (*Xanthium spp.*)								xx	xx			
Marsh elder (*Iva ciliata* and *xanthifolia*)								xx	xxxx	xx		
Annual sage (*Artemisia annua*)									xx			

TABLE I
HAY FEVER PLANTS IN MISSOURI

	Jan.	Feb	Mar.	Apr	May	June	July	Aug.	Sept.	Oct	Nov.	Dec.
Hazelnut (*Corylus americana*)												
Box elder (*Acer negundo*)		x	xx									
Maple (*Acer spp.*)			x	xxxx								
Elm (*Ulmus americana* and other *spp.*)		x	xxxx									
Poplar (*Populus deltoides* and other *spp.*)			xxx	xx								
Ash (*Fraxinus spp.*)			x	xxxx								
Willow (*Salix spp.*)				xxx	x							
Sweet gum (*Liquidambar styraciflua*)			xx	xxxx								
Mulberry, paper (*Broussonetia papyrifera*)				xx	xx							
Oak (*Quercus spp.*)					xxx							
Sycamore (*Platanus occidentalis*)				xx	xxxx	x						
Hickory (*Carya spp.*)				xx	xxxx							
Walnut (*Juglans nigra*)					xxxx	x						
English plantain (*Plantago lanceolata*)					xxxx	x						
Red sorrel (*Rumex acetosella*)					xx	xxxx	xxxx	x				
Annual bluegrass (*Poa annua*)					xxxx	xxxx	xxx					
Kentucky bluegrass (*Poa pratensis*)					xxxx							
					xx	xxxx						

marked skin sensitivity to one species and only slight sensitivity, if any, to all others.

Early Weeds. The two common weeds which shed ap-

TABLE II

Ragweed Pollen Count, St. Louis, Missouri, 1953

August		*September*		*October*	
1st	2	1st	32	1st	4
2	2	2	32	2	3
3	1	3	55	3	2
4	5	4	138	4	1
5	4	5	139	5	0
6	1	6	140	6	0
7	1	7	140	7	1
8	4	8	83	8	0
9	4	9	106	9	0
10	3	10	46	10	0
11	3	11	100		
12	12	12	154		
13	5	13	154		
14	9	14	152		
15	20	15	101		
16	29	16	63		
17	30	17	103		
18	69	18	83		
19	40	19	80		
20	60	20	52		
21	80	21	29		
22	74	22	16		
23	74	23	14		
24	50	24	29		
25	45	25	18		
26	50	26	9		
27	45	27	10		
28	74	28	9		
29	105	29	7		
30	130	30	6		
31	80				
Total	1111		2100		11

Grand Total—3222

preciable amounts of pollen during the grass season are red sorrel and English plantain The former, a member of the dock genus, found mostly in acid pastures and old fields, is of little interest because of the low allergenic quality of its pollen. English plantain pollen is a bit more active, but

in the sparsely populated wooded areas. Oaks, though seldom planted in cities, are so abundant in native woods as to account for a large part of the atmospheric pollen contamination in late spring. Because the several species have somewhat different periods of pollination, the oak season is unusually long. Cottonwood and ash are frequently planted for shade, but though they produce fairly well they are infrequent causes of sensitization. Other maples than box elder are rarely involved.

Hickories, including pecan, are almost as widely distributed in virgin forests as are the numerous oak species, but their pollen is heavy and not nearly as likely to be found in the air in the large centers of population as that of elm and oak. Junipers are present in the White River area in the southern edge of the State but have not been incriminated as local sources of allergy. The sycamore trees present, particularly along streams and in low wet ground, contribute considerably to the cause of hay fever in May Paper mulberry and tree of heaven are city "weed" trees of occasional importance in cases with very close exposure Beech trees are native in the southeastern part of the state. Their output of pollen is small and the grains are heavy.

Grasses. The season of grass pollen distribution begins in late May just as the tree pollen season is closing. June is the grass month, but exposure to small amounts of grass pollen is possible, particularly in rural areas, throughout the summer and fall. A very large share of the air-borne grass pollens in Missouri comes from bluegrass, orchard grass, redtop and timothy, which are not only much used in meadows and pastures but are also common in waste places and along roadsides. Of the less important sources, Canada bluegrass is probably the most widely distributed and most productive. The numerous wild pasture grasses contribute very little.

In general, a grass pollen sensitive individual is sensitive to all grass pollens encountered. One kind of grass pollen, bluegrass, for example, might be used for all testing and treatment, except for the fact that occasional cases show

soil of low moist situations and is therefore too restricted in acreage to be of more than minor consequence anywhere in the State. The only other widely distributed ragweed is cocklebur. Though abundant in farmland everywhere, it sheds such a small amount of pollen—probably less than 2% of the total

TABLE III

INCIDENCE OF MOLD COLONIES ON EXPOSED CULTURE MEDIA (PETRI DISHES) FROM MAY THROUGH OCTOBER, 1951, ST LOUIS, MO

	Hormodendrum	*Alternaria*	*Spondylocladium*	*Helminthosporium*	*Fusarium*	*Aspergillus*	*Penicillium*	*Phoma*	*Total*
May	7	19	26	18	11	16	4	26	157
June	31	52	10	19	48	22	9	27	218
July	16	24	13	12	17	26	11	13	132
August	14	28	3	32	14	19	7	4	121
September	9	81	9	18	22	31	13	9	192
October	14	46	19	13	24	31	13	13	173
Total	91	280	80	112	136	145	57	92	993

—that it must be regarded as of academic interest only. Actually the pollen is one of the most active of all ragweed species The ragweed season extends from August 10 to October 15 with average maximum dispersal between September 1 and 7

Sages (*Artemisia*), except annual sage, have been almost totally destroyed in the cultivated prairie counties and are not a factor in the production of allergenic pollen in Missouri. Annual sage is a possible local factor in supplementing ragweed pollen irritation The plant is found only in waste places in the larger cities, seldom if ever on farms

Air-Borne Fungi Air-borne fungi contribute appreciably to the allergic syndrome in mold sensitive individuals in

though it continues well into the summer it is seldom if ever a specific cause of allergy.

The midsummer weeds of farms and gardens include the pigweeds, or amaranths, and the goosefoots, particularly lamb's quarters. None of these produce pollen in active quantity. Small growths of Russian thistle, a member of the goosefoot family, can be found in dry waste places or sandy soil, particularly during dry seasons, but again the quantity of pollen produced is far below the effective level for sensitization or even irritation of persons already sensitized by residence in the plains area. A comparative newcomer of the same botanical group, Mexican firebush, or kochia, is now well established in waste places in Kansas City, St. Louis and a few points along the Missouri River. While its present role in allergy is still a minor one, its menace should not be overlooked. The only member of the pigweed group which is capable of extensive air contamination is western water hemp found in all cultivated lowlands. Its output of pollen per acre is as great as that of ragweed, but only occasionally is a large total annual count recorded in Kansas City or St Louis. Experience shows that there are very few cases of specific sensitiveness to this potentially important pollen

In the northwest corner of Missouri, including the area of Kansas City, hemp, otherwise known as marihuana, is an important local factor. The pollen is known to be very active allergenically in areas where it is abundant in the air.

The Ragweeds. Ragweed pollen is by far the most important cause of pollinosis in Missouri. Three species of true ragweed *(Ambrosia)* are widely distributed throughout most of the State—short ragweed, giant ragweed and southern ragweed Certainly a very large part of the air-borne ragweed pollen of the State comes from the first two, but in some parts of the Ozark Area southern ragweed is the dominant upland ragweed. Cultivation has destroyed almost all traces of western ragweed *(A psilostachya)* Burweed marsh elder, or prairie ragweed, is abundant enough in the northwest corner of the State to be reckoned with in diagnosis and treatment of ragweed allergy. Rough marsh elder is confined to undisturbed

soil of low moist situations and is therefore too restricted in acreage to be of more than minor consequence anywhere in the State. The only other widely distributed ragweed is cocklebur. Though abundant in farmland everywhere, it sheds such a small amount of pollen—probably less than 2% of the total

TABLE III

INCIDENCE OF MOLD COLONIES ON EXPOSED CULTURE MEDIA (PETRI DISHES) FROM MAY THROUGH OCTOBER, 1951, ST LOUIS, MO

	Hormodendrum	*Alternaria*	*Spondylocladium*	*Helminthosporium*	*Fusarium*	*Aspergillus*	*Penicillium*	*Phoma*	*Total*
May	7	49	26	18	11	16	4	26	157
June	31	52	10	19	48	22	9	27	218
July	16	24	13	12	17	26	11	13	132
August	14	28	3	32	14	19	7	4	121
September	9	81	9	18	22	31	13	9	192
October	14	46	19	13	24	31	13	13	173
Total	91	280	80	112	136	145	57	92	993

—that it must be regarded as of academic interest only. Actually the pollen is one of the most active of all ragweed species The ragweed season extends from August 10 to October 15 with average maximum dispersal between September 1 and 7

Sages (*Artemisia*), except annual sage, have been almost totally destroyed in the cultivated prairie counties and are not a factor in the production of allergenic pollen in Missouri Annual sage is a possible local factor in supplementing ragweed pollen irritation The plant is found only in waste places in the larger cities, seldom if ever on farms

Air-Borne Fungi Air-borne fungi contribute appreciably to the allergic syndrome in mold sensitive individuals in

Missouri. They can be cultured daily from the atmosphere, and spores of several species are demonstrable on the gravity slides. Mildew and musty odors are common, particularly in basements of residences and churches and in summer cottages The most common air-borne molds encountered are *Alternaria*, followed in frequency by *Aspergillus, Fusarium, Helminthosporium, Phoma, Hormodendrum, Spondylocladium and Penicillium,* based upon an atmospheric survey using exposed culture plates, as part of a general survey sponsored by the Mold Committee of the American Academy of Allergy in the summer of 1951, Table II. These molds correspond in general to those encountered in similar surveys conducted in other sections of the country.

Whereas molds appear on the culture plates daily, there is tendency for a smaller air-borne mold concentration in the winter and spring. The smallest counts occurred in December, January, February, March and April; the highest counts were in June, July, August, September and particularly in October. In the author's clinical observation, inhalation of mold spores plays a large part in the production of respiratory allergic syndromes in St. Louis.

SUMMARY

Missouri, located in central mid-west United States in the Mississippi river valley, has a variety of farming, mining and industrial interests.

Pollen dissemination is abundant in Missouri from March to October, the principal pollens being maple, elm, poplar and cottonwood, ash, oak, sycamore and hickory tree pollens, numerous grass pollens and ragweed pollens. The ragweed *pollen season is considered a severe one*

Fungi are prominent and air-borne mold spores are prevalent all year with the greatest concentration in the summer and fall.

The climate of Missouri, in general, is humid and is not advantageous to individuals with allergic rhinitis and asthma that is influenced adversely by humid weather and by air-borne pollens and mold spores.

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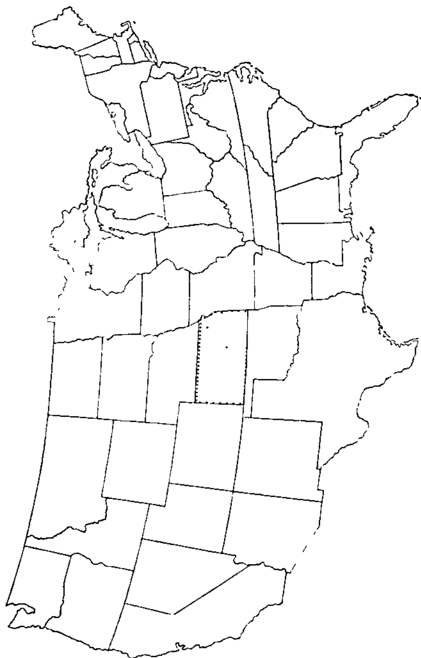
Kansas

By ARCHIBALD J. BRIER, M.D.

THE "Sunflower State," central in location of the 48 states, contains nearly 2,000,000 people—1.4% of the total population of the United States. Kansas people are 96.3% white (mostly native born). Almost all of the remaining 3.7% are negroes. About one-third of the people live on farms, distributed roughly at an average of eight persons per square mile. Approximately half of the urban and rural non-farm population is accounted for by the two large and one smaller metropolitan centers, Wichita in the south central part, Kansas City and Topeka in the northeast corner. During the past decade Wichita has become the largest city, having increased in population some 30%, thus rating a considerable margin over Kansas City (Kansas). However, the Kansas City metropolitan area is still the larger. Kansas ranks high in general literacy. Only 12 persons, 10 years of age or above, out of every 1,000 are unable to write. Of all state and local funds collected, 35% goes to the schools.

Kansas is distinct from its four surrounding prairie and plains states only in some of its historical and political aspects, neither of which has any unique bearing on the allergenic hazards of its citizens. Nothing in their social or economic life or in the State's climate, flora or fauna creates exclusive local allergy problems. The range of foods available and preferred is now almost as great as in any other section of our land. The advantage, therefore, of this separate treatment is chiefly that of fewer generalizations and a better focus on the more important allergenic data than would be possible in discussing a larger geographic unit.

Physical Features. Rectangular in shape, approximately 200 by 400 miles and tipped lengthwise eastward at an average



slant of seven feet per mile, Kansas is in its eastern third a rolling prairie which gradually levels out as it merges into the Great Plains The highest point in the State, about midway along the western border, has an altitude of 4,135 feet, while the eastern border averages 850 feet. Actually there is a scrap of Ozark terrain in the southeastermost county, so that the lowest point in the state—700 feet—is found some 50 miles west of the corner. In spite of the gradual eastward slant, there are two distinct water sheds, divided by a slight ridge running east and west through the center of the state. that of the Kansas River (or the Kaw) and its tributaries draining the north half, and that of the Arkansas River and tributaries draining most of the south half In general, the soil is a deep rich clay loam on the uplands and deep rich black loam in bottomlands, except for occasional limestone areas in the eastern section and the more extensive sand hills of the southwestern counties.

Weather and Climate. The Kansas climate has been described as "salubrious"—meaning that the winters are mild and the summer heat tolerable because of the constant dry breezes. But it must be admitted that extremes of heat and cold are often experienced, as is true of any mid-continental area unprotected by mountains or forests and without the modifying influence of any large body of water within or near its borders The average state-wide annual mean temperature is reported to be 54.3° with only slight variation from year to year, but the winter and summer extremes range from an all-time minimum of −34° to an all-time maximum of 116°. The crop growing season, from killing frost in the spring to killing frost in the fall, averages just six months in the southeastern part and somewhat less in the northwest.

State-wide rainfall varies considerably more than the temperature An average annual rainfall of 35 inches (in the eastern third of the State) is usually sufficient for diversified farming even though humidity is often low and evaporation accounts for rapid losses of soil moisture. A bare average of 20 inches along the Colorado border with even heavier evap-

oration than takes place in eastern Kansas does not insure regular or abundant crop yields. Periodic droughts lasting for several years have occurred at least four times during the last century, that of 1932 to 1936 being responsible for the serious "dust bowl" conditions of that time Occasionally throughout the state or in a large section there are seasons with far too much rain, resulting in disastrous floods. Blizzards are still to be feared, though modern communication and transportation have minimized the personal and economic hazards. Tornadoes are occasional in the spring months. In spite of these difficulties, farming is successful even in western Kansas more often than not. Irrigation is practiced in only two or three western counties adjacent to the Arkansas River.

Wind velocities on the unobstructed plains are often high, the prevailing direction being from the southwest. These winds have a decided effect on allergy both in the distribution of certain weed seeds and the accelerated dispersal of pollen. The percentage of sunshiny days is high.

Flora. Originally extreme eastern Kansas boasted some rather well wooded local areas of the common hardwoods: oak, elm, walnut, ash, sycamore, hickory, maple and poplar. Any appreciable acreage of such woodland has long since disappeared, but in the east central and north central parts there are still tree fringes along the streams Every town and country home has grown its quota, though sometimes very limited, of sturdy shade trees—usually elm, cottonwood, ash or box elder. Since the drought of the 1930's, shelter belts have been stretched across most of the western counties in an effort to prevent wind erosion of the top soil. The native bunch grasses of eastern and central Kansas and the carpet-like buffalo grass of the treeless great plains have practically disappeared because of overgrazing and (often ill advised) farming. Wind-pollinated trees and heavy pollinating meadow grasses increased their range and frequency during the past 100 years. Certainly the troublesome allergenic weeds have all been introduced since the days of the Indian and buffalo or have been developed from comparatively inoffensive native species incident to the wholesale destruction of the virgin sod

All too often in the western section crop failures cause sizable plots of land to be temporarily or permanently abandoned, and each year a portion of the wheat land is allowed to lie fallow. These and other farm practices have necessarily encouraged the multiplication and migration of weeds, such as the westward march of the ragweeds and the eastern spread of Russian thistle and firebush.

Agriculture and Industry. The wealth of Kansas is in the products of its soil, either in their raw or processed form. The income from wheat, corn and oats is about equal to that from hay, livestock and dairying These leading products are the basis of such outstanding industries as flour milling and meat packing Wheat is the principal crop in the western counties. While corn is king in the central and eastern counties, diversified farming is the rule in the corn belt. A cornfield can be kept reasonably free of allergenic weeds by modern farm machinery, but wheat and other small grain, as well as soy bean and other row crops, are often full of ragweed, or, in the western counties Russian thistle

Grain fields, as well as old stubble and straw, are excellent *media* for the culture of vast quantities of soil molds whose spores are nearly as active as pollens Harvest operations, including threshing, constitute an extreme hazard for allergenic persons who assist in the work Milling and stock feed processing are almost as bad Exposure to animal epidermals is frequent for a large part of the population of the state Fortunately, neither the petroleum industries, mining, airplane manufacture nor transportation contribute appreciably to the overall allergy problem

The Seasonal Inhalants. Air-borne pollens and spores are likely to be encountered in appreciable concentrations from early spring until late fall—approximately nine months out of the year The early-flowering trees sometimes reach anthesis by mid-February but usually not before March All of the important trees have finished pollination by the end of May. The grass season begins in May and gradually diminishes after the first of July Before the grasses have finished, the chenopods and amaranths come into bloom. Their season then merges

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Sycamore *(Platanus occidentalis)*. Eastern in distribution, rare offender.

Hackberry *(Celtis occidentalis)*. Mostly eastern, occasional elsewhere except Southwest, meager producer, rare offender.

Oak *(Quercus spp.)*. No less than 10 oak species are found in the eastern part, extending westward along streams, but oak reaching farthest southwest Heavy producers, occasional offenders Pollens of similar antigenic quality.

Black Walnut *(Juglans nigra)*. Native in eastern part only but planted farther west, occasional offender.

Butternut *(Juglans cinerea)*. Very limited distribution in eastern part Pollen inter-reacts with black walnut and the hickories.

Hickory *(Carya spp.)* Five species, including pecan, common in eastern part, occasional offenders Pollens are of similar antigenic quality

Osage Orange *(Maclura pomifera)*. Once very popular in eastern and central Kansas as a farm fence hedge Has now almost disappeared, rare reactor

The following native cultivated trees and shrubs of eastern Kansas are very minor possible causes of allergy. tree of heaven *(Ailanthus glandulosa)*, basswood *(Tilia americana)*, paper mulberry *(Broussonetia papyrifera)*, hazelnut *(Corylus americana)*, ironwood *(Ostrya virginiana)*, hornbeam *(Carpinus caroliniana)*, and red birch *(Betula nigra)*

THE GRASSES

Dr Frank C Gates in his comprehensive treatise, *Grasses in Kansas*,[3] has the following to say about those regarded as causes of hay fever· "Chief among these grasses in Kansas are orchard grass *(Dactylis glomerata)*, bluegrass *(Poa pratensis)*, meadow fescue *(Festuca elatior)*, rye or ray grass *(Lolium perenne)*, western wheat grass (Agropyron smithii), rye *(Secale cereale)*, tall oat grass *(Arrhenatherum elatius)*, timothy *(Phleum pratense)*, redtop *(Agrostis alba)*, Bermuda grass (Cynodon dactylon), sweet vernal grass *(Anthoxanthum odoratum)*, Johnson grass *(Sorghum halepense)*, and corn or maize

with that of the ragweeds, which begin to shed pollen during the second or third week of August. All pollens disappear from the air by the third week of October, but the mold spores which appear in early summer last until late in the fall—in fact, until the advent of freezing weather.

WIND-POLLINATED TREES

Although the amount of air-borne tree pollen may often sometimes equal or exceed that of the ragweeds, cases of specific tree pollen sensitiveness from any and all species are comparatively rare—not nearly so many as of grass pollen sensitiveness. In the following list the trees are arranged in their approximate order of pollination through March, April and May. Of the numerous native and cultivated tree species found in Kansas, the elms, oaks, hickories and walnuts are the most frequent reactors on skin testing and the most likely causes of early spring hay fever.

Soft maple *(Acer saccharinum)*, a common native species frequently planted for shade, is the first tree to reach anthesis. But it produces too meagerly to be of more than minor academic interest.

American elm *(Ulmus americana)*, a native species which is probably the most popular shade tree in the State and the source of large amounts of pollen in the eastern and central part. Slippery elm *(U. fulva)* is not nearly so common. Chinese elms are now planted throughout and constitute an added source of active allergenic pollen

Willow *(Salix spp.)*, found mostly along streams, production meager.

Poplar *(Populus spp.)*, including cottonwood and several widely planted horticultural varieties Cottonwood is the dominant native and cultivated tree of the plains. Production abundant, rarely causes allergy

Box elder *(Acer negundo)*. Native and widely planted throughout, production moderate, occasional offender.

Ash *(Fraxinus spp.)*. Native and widely planted throughout, production copious, rare offender.

as a group next in importance in allergenic quality to the ragweeds They average reaching anthesis a month ahead of the ragweeds Russian thistle *(Salsola pestifer)*, the worst offender in this group, is a plant of the dry alkaline soils of the western half of the State and is of no clinical significance in the eastern half This weed invaded Kansas from the Dakotas in the 1880's just as the plains were being homesteaded. While the output of pollen is far less per weed and per acre than that of short ragweed or giant ragweed, the pollen is so active that in many counties in the west part of the state it outranks all other sources of pollen in a number of its victims.

Firebush *(Kochia scoparia)*, otherwise known as summer cypress, burning bush and Mexican fireweed, a similar and closely related goosefoot, is a much later introduction than Russian thistle. Since the 1920's it has spread rapidly from west to east, and it is now a very common waste-land weed in all except the southeastern part of the State. Unlike Russian thistle, which cannot compete with other vegetation in areas where the annual rainfall amounts to 30 inches or more, firebush is an able competitor of all other weeds in both dry and moist locations It is now abundant all along the Kaw Valley. Its pollen is heavier than Russian thistle and its allergenic quality probably considerably less. Clinical evaluation is not complete

Conspicuous amaranths of Kansas are pigweed *(Amaranthus retroflexus)*, sometimes called redroot or rough pigweed, Torrey's amaranth *(A Torreyi)*, and western water hemp *(Acnida tamariscina)* While rough pigweed and several allied species are extremely common in fields and neglected gardens throughout the state, and while pigweed pollen is very active, as proved by skin testing, the total output is comparatively small—far less than that of Palmer's amaranth, Torrey's amaranth or western water hemp All three of these are dioecious —producing pollen and seeds on separate plants Palmer's amaranth is found in only a few counties in the south central part of the State, but Torrey's amaranth in no less than 15 counties in the southwestern corner [3] Western water hemp is

(Zea mays)." It is noteworthy that of this list only western wheat grass is a native wild grass, and even western wheat grass produces far less abundantly than bluegrass, timothy, and orchard grass. Bermuda grass has been introduced from the South and is gradually extending its range in Southern Kansas. Its role in that part of the state has not been accurately assessed. Sweet vernal grass is rarely planted. Several species of brome grass *(Bromus)*—not particularly abundant producers—have been introduced into the drier parts of the state. Sudan grass *(Sorghum sudanensis)*, a closely related species to Johnson grass, is frequently planted for hay. Corn pollen is extremely heavy and can be contacted only by those working in or very near the cornfields during July and August. Upper air contamination with grass pollens of any sort is far less even in the eastern half of the state than that of the ragweeds or the goosefoots and amaranths.

WEEDS OF LATE SPRING AND SUMMER

The earliest wind-pollinated weeds are English plantain *(Plantago lanceolata)* and red sorrel *(Rumex acetosella)*. Both appear during the grass pollinating season and neither is of more than minor importance. English plantain thrives in waste places and particularly on lawns in the eastern third of the state. Its season of heaviest pollination is June and July, though stray grains may still be found in the air until the end of summer. Very few persons in Kansas are clinically sensitive, and likely none are specifically sensitive to its pollen.

Red sorrel is found most abundantly in about the same area as English plantain. It prefers, meadows and fallow fields and does best on acid or other low grade soils. The season of pollination does not last nearly as long as that of English plantain, and the pollen is even less allergenic. It produces much more abundantly than any of the other docks.

WEEDS OF MIDSUMMER AND FALL

The goosefoots *(Chenopodiaceae)* and the amaranths *(Amaranthaceae)*, also known as carelessweeds and pigweeds, are

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extremely common in the eastern half of the state, particularly in the Kaw Valley, and fairly common in moist land elsewhere, except the northwest fifth and the two western tiers of counties. In river bottom areas its output often exceeds that of ragweed. The toxic quality of the pollen seems to be lower than that of ragweed or Russian thistle, but it should not be neglected in skin testing.

WEEDS OF LATE SUMMER AND FALL

The ragweeds are of outstanding importance in Eastern Kansas and of gradually diminishing importance from the center to the western border Counting four species of cocklebur, there are no less than 13 ragweed species found in the state. Of these, short ragweed *(Ambrosia elatior)* and giant ragweed *(A. trifida)* are far more important than all the others taken together. Short ragweed is a conspicuous plant throughout the eastern half of the State, being found in fields, particularly wheat fields, in gardens, roadsides and neglected areas In the center of the State it begins to be replaced, particularly on dry upland, by western ragweed *(A. psilostachya)*, a coarse perennial species which ranks far below short ragweed in pollen production. Giant ragweed is often the sole occupant of moist rich bottom lands and moist waste places in eastern Kansas and diminishes markedly in the western part of the state as its suitable habitats are reduced in number and area of acreage The only other true ragweed of Kansas is southern ragweed *(A. bidentata)*, common only in the extreme southeastern corner of the state It produces fairly well and may be considered a minor contributor to the total ragweed exposure in that part of the state Burweed marsh elder *(Iva xanthifolia)*, otherwise known as prairie ragweed or tall poverty weed and sometimes classified botanically as *Cyclachaena xanthifolia*, is probably third in importance among the ragweeds considering the state as a whole. Its approximate range is the area north of the Arkansas River to Wichita and the northeastern part of the State It prefers the same soil as giant ragweed but will thrive with considerably less moisture. In some localities in the northwest corner of the State it is the dominant ragweed

in spite of the general low rainfall of the area. The pollen, while abundant, is probably not as active as that of short ragweed and giant ragweed. Rough marsh elder (*Iva ciliata*) is frequent in the eastern third of the state in damp soil, preferably damp prairies. The acreage is not great and its contribution, though not accurately assessed, is probably a minor one. Difficulty of evaluation of not only marsh elder but southern ragweed is caused by the similarity of the pollen grains to those of the other ragweeds. Thus atmospheric tests are not very helpful.

The false ragweeds occur in the western half of the State but not in quantity sufficient to be of more than academic interest.

The sagebrush family (*Artemisia*) is well represented in Kansas by prairie sage (*A. ludoviciana*) and several closely related species widely scattered throughout the State in virgin soil. Sand sagebrush (*A. filifolia*) is very common in the sandy areas, particularly along the Cimarron River in the southwest corner of the State. Air contamination with *Artemisia* pollen has not been tested in the sand sagebrush area where the population is sparse, but prairie sage certainly adds very little to the pollen contamination of the air. This type of pollen is therefore probably only of academic interest because it interreacts with ragweed pollen.

THE AIR-BORNE SPORES OF FUNGI

Vast quantities of spores of stem rust, smut, *Alternaria* and *Hormodendrum* are matured in the wheat fields of Kansas each year. The season of dispersal begins as early as June and lasts until freezing weather. The local and general incidence of these spores is often greater than that of the pollens. *Alternaria* is outstanding as a sensitizer. Rusts seems to be quite inactive and smuts only on those contacting overwhelming quantities in handling and processing grain.

1 GATES, F. C. *Grasses in Kansas*. Kansas State Board of Agr., Topeka, 55 220-A, 1936.

2 GATES, F. C. *Weeds in Kansas*. Kansas State Board of Agr., Topeka, 60 243, 1941.

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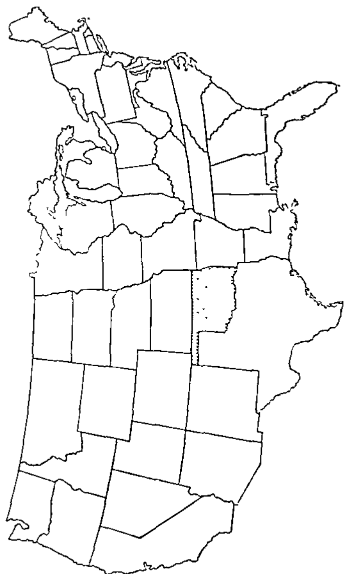
Oklahoma

By JOHNNY A. BLUE, M.D.

HISTORY and Population. Because of the unique manner of settlement and growth of Oklahoma, history has played a part in the development of allergy in this country. The name "Oklahoma" is a combination of two Indian words meaning *home of the Redman.* This land was set aside for this purpose, and the Five Civilized Tribes were moved here from the Northeastern, East Central and Southeastern States in an historic pilgrimage Later the Plains Indians were moved to Southwestern Oklahoma Because of the abundance of unsettled land, Oklahoma was opened to homestead settlement April 22, 1889, at which time an estimated 100,000 homesteaders made the famous "run of '89" seeking a home in this land of the Redman. Thus Oklahoma went from tents to towers in a matter of hours. Her rolling plains were broken by the plow, her native forests felled by the axe. In a few months her vegetation was greatly altered, her creeks and river beds broadened. All this came about because of the influx of a new adult population.

Following the settlement of Oklahoma the central and southern areas were divided into small farms, while the western and northern sections, called the "Cherokee Strip," became large stock ranches. The strip was later opened for homesteading and thus became divided into smaller ranch units. But the small farms are now being slowly wiped out with the replacement of the horse with power machinery and the creation of large farms of multiple sections rather than the conventional quarter section of 160 acres. Ranches are also increasing in size.

The people of Oklahoma are 99.1% American born. In spite



of the Redman name, a look at the statistics reveals that out of a population of 2,233,351, 2,032,555 are white and only 200,796 are non-white. Approximately one-third of the latter are Indians. The remainder are Negroes. There seems to be very little, if any, difference in the percentage of allergic conditions manifested in the above races. Thus the idea that Indians are not subject to allergy is erroneous. Our Indians have hay fever, bronchial asthma, allergic eczema, urticaria, and allergic headaches about as frequently per capita as do other races.

Weather and Climate. Oklahoma's famous humorist-statesman, the late Will Rogers, once said, "If you don't like the climate here just wait a few minutes." It is doubtful that even he could have conceived of the fantastic visitations which occurred in Oklahoma April 9, 1952, between midnight and noon. In this 12 hour period the state experienced a dust storm, rain, hail, snow, a little sunshine, and an earthquake. These are the exceptions of a weather picture that fluctuates rapidly from one extreme to another. Even so the climatic conditions on the whole in Oklahoma are mild and delightful, usually with moderate winters, summers with low humidity and moderate night temperatures and with a long Indian Summer. Fog is infrequent. There is no smog or noxious smokes or fumes because natural gas is used almost exclusively as a fuel.

Rainfall, one of the most important factors in determination of native and introduced flora, varies in Oklahoma from an average annual figure of more than 40 inches in the southeast corner to a bare 15 inches in the northwest corner of the State. This range of moisture largely accounts for the forests of the eastern counties and the dust bowl flora of the Oklahoma Panhandle During very dry seasons or cycles of seasons the drought resistant weeds of the western plains extend their range eastward into the diversified farming area During wet years the erstwhile dormant native farm weeds are able to choke out the prairie weeds and thus seem to move westward.

Prevailing winds are from the south 11 months out of the

year. Only in February do they come from the north. The wind velocity averages 11.1 mph in the central area. The highest monthly average wind velocity is in March with an average of 13.3 mph, and the lowest monthly average wind velocity is 9.0 mph in August. Velocities are higher in the north and western part of the State and possibly a little lower in the southeastern section of the State.

The annual total number of hours of sunshine is 3,000. The proportion of possible hours of sunshine is 67% Oklahoma City ranks as one of the highest among comparable sized and larger cities of the nation in this respect. Normal storm paths over the United States miss Oklahoma. Thus long continued stormy weather is infrequent.

The mean temperature in the central area is 60.2°. The average temperature of the three summer months is 79.9°. The average temperature of the three winter months is 39.3°. January with an average of 37.6° has the lowest mean monthly minimum temperature January also has the lowest daily average temperature of any month with 27.8°. Cold snaps are of short duration with barometric pressure frequently changing The temperature may change from 20° to 40° in a matter of a few hours Such rapid changes affect allergic membranes. They are conducive to the development of "colds" and bring out food allergies The average date for the last killing frost in Oklahoma City is March 28. The first killing frost is November 6 The average vegetative growth season in the Oklahoma City area is 224 days In the State as a whole it ranges from 180 days in the extreme northwest to 240 days in the extreme southeast The highest mean monthly temperature is July with 81.4 The highest daily average temperature is August with 92.3. These figures are somewhat higher both in the low and and high temperatures in the high plains areas of the west and northwest portions of the State

The average humidity in the central portion of the State is 54% This ranges much lower in the western part of the State and is a little higher in the hilly and wooded areas of the east and southeastern portions of the State Even though Ok-

lahoma has a relatively low humidity, there is an abundance of water evaporating cooling units, as well as refrigerated units, in use several months out of the year in business houses and theaters, as well as in many homes. These seem to be an aggravating factor in most asthmatics and many allergic rhinitis cases.

The long Indian Summer is conducive to continuous plant growth and pollination Since Oklahoma has a warm climate with a low humidity, high wind velocity and an abundance of trees, grasses and weeds, there are pollens and mold spores in the air most of the time. During the warmer months, which comprise nine or 10 months of the year, windows and doors of homes and business places remain open, allowing pollens, dust and mold spores to collect in abundance. Electric fans help to keep the air-borne allergens in suspension. Sprinkler type of air conditioning raises the humidity and causes rapid temperature changes on entering and leaving such places. These abrupt changes affect allergic membranes. The circulating hot air furnaces are commonly used for home heating. This continued circulation of air can keep the allergens stirred up during the cooler months when dwelling and business places are closed. Thus long after frost and well into winter pollens remain a potent factor in allergy.

Oklahoma's topography is as varied as her climate and the uniqueness of her settlement. The eastern boundary cuts well into the rugged foothills of the Ozark Mountains, and the Panhandle of the northeast corner reaches far out on the Great Plains. The streams flow southeasterly with gradual descent of the land altitude from nearly 5,000 feet in the northwest corner to 300 feet in the southeast corner The average elevation is 1,300 feet above sea level. Without any natural lakes a system of dams is rapidly filling the State with lakes and ponds When the present water control projects are completed, Oklahoma will rank near the top in this respect The impounded waters will doubtless have some effect on weather and vegetation locally.

The eastern and southeastern portions are rugged and con-

tain large forest sections, particularly the portion adjacent to and a part of the Ozark region. The ancient Arbuckle chain of mountains separates the central from the south portion of Oklahoma, and the Wichita Mountains run southerly in the southwestern part of the state Progressively to the west and north the surface is gently rolling to flat.

Agriculture and Industry. Even though Oklahoma is a leading oil and gas producing state, and has rich lead, zinc, and coal mines, the industries play a minor part in the etiology of allergy The wealth of the State is principally that of the land—agriculture and stock raising—and the troublesome allergens come from the native and cultivated trees, grasses and grain, the weeds that follow the plow, the soil molds, and from animal danders In both the central and eastern areas a considerable amount of upland of the central and southern parts has been abandoned and removed from cultivation This land has become eroded and has been taken over by weeds and grass or turned back to commercial grass and natural grass pasture. The more rolling parts are given to diversified farming—corn, cotton and small grains But even here there are large untillable and fallow areas inviting extensive weed growths, as well as ample opportunity for such vegetation in pastures, in wheat land and even in row crops In the semi-arid high plains of the west and northwest portions, vegetation is comparatively sparse, particularly in dry years. This area consists of large cattle ranches and of large wheat ranches where a sizable portion of each ranch is always devoted to summer fallow and thus to pernicious weeds

The Allergy Calendar. Active allergenic pollens are found in Oklahoma in considerably greater variety than in the eastern parts of the United States. One may start from the center of Oklahoma and within a few hours driving time collect representative species of almost all the important plant families of the whole country. Tree pollens appear in the air as early as January and last until May The grasses begin shedding pollen in early May and continue throughout the summer The carelessweed and goosefoot pollen seasons occur

simultaneously, running from late June to mid September with a climax in late August or early September. Mold spores are dispersed during all of the warm months and well into winter. The climax of air contamination comes with the anthesis of the ragweeds in late August and early September when most of the other major weed offenders as well as the mold spores are in peak production.

The grain dusts and mill dust are year around factors in the grain growing and grain processing districts of Central and Western Oklahoma. Cotton gin dust is troublesome in the south half of the State.

Anemophilous Trees. The variety of wind-pollinated trees in eastern Oklahoma is striking. Of oaks alone there are no less than 20 species. Elms and oaks lead in pollen production. Junipers are plentiful though their pollen is of minor significance in allergy. Black walnut and numerous hickory species, including pecan, are widely distributed in Eastern Oklahoma and are fairly abundant producers of active allergenic pollen. Minor sources of tree pollen are the maples (including box elder), ash, cottonwood and sycamore. Oaks and cottonwoods are common along the streams of Central Oklahoma and are widely planted for shade throughout the State, even in the most arid regions Because of the intermittent warm and cold periods of springtime, dates of pollination of a given species may vary greatly from year to year. Interruptions of cold weather may delay the termination of pollination of any of the tree species, thus prolonging the "season."

Grasses. While northern meadow and pasture grasses, such as bluegrass and timothy, are occasionally cultivated in the northeast corner of the State, most of the troublesome grass pollen comes from Bermuda grass *(Cynodon dactylon)*, Johnson grass *(Sorghum halepense)* and a small list of native species. Bermuda grass, once used only as a lawn grass, now grows wild and has become a commercial pasture grass because of its hardiness and its ability to hold the soil. It has invaded many lowlands and is abundant on all highway shoulders. Its production of pollen is very moderate as compared

with the production of bluegrass, timothy and orchard grass. But Bermuda grass pollen seems to be unusually buoyant and is certainly more allergenic than that of most other grasses. Pollination can take place at any time during the summer and fall when conditions are favorable, and the pollen probably is present in homes and public buildings throughout most of the year. Johnson grass, which came into the State as a contaminant in commercial seeds and which was in some instances planted for pasture, now has invaded most of the bar ditches, highways, creeks and river bottoms. It produces somewhat better than Bermuda, but the pollen grains are much heavier and their range of dispersal thus much restricted. The active season is not quite as long as that of Bermuda In the western two-thirds of the State, western wheat grass (*Agropyron smithii*) sheds a moderate amount of pollen for a very short period in June Grama grasses (*Bouteloua spp*), the so-called Bermudas of the plains, have for some time been ecouraged as pasture and reclamation grasses in the wind-eroded West. They produce modest amounts of pollen and are probably a factor in hay fever and asthma in Western and Central Oklahoma Italian ryegrass (*Lolium multiflorum*) is becoming increasingly popular throughout as a cover crop, winter pasture and lawn grass The pollen seems to be particularly active allergenically. Most of the numerous native grasses produce so meagerly as to be regarded as negligible sources of allergenic pollen Corn is the only cereal grass that is outstandingly productive However, the corn pollen grains are even heavier than those of Johnson grass and their dispersal range much more restricted

Amaranths and Chenopods. The amaranths (*Amaranthaceae*), or pigweeds, and the chenopods (*Chenopodiaceae*), or goosefoots, all of which thrive on tilled and fallow land and in waste places, are very closely related botanically. The similar antigenic qualities of their pollens are proved by the frequence of inter-reaction in skin testing and treatment. Also morphologically the pollen grains in the two families are very much alike

The principal amaranths are Palmer's amaranth *(Amaranthus palmeri)*, common pigweed *(A. retroflexus)*, also known as redroot pigweed, and western water hemp *(Acnida tamariscina)*. The latter, which is found in the more moist places in every county, leads in total pollen production and is most abundant in the central and north central parts of the state. Pigweed, though widely distributed in farms and gardens, produces meagerly so that its total contribution to air contamination is small. Palmer's amaranth is an upland farm weed which does not thrive in dry alkaline soil. It produces almost as well as water hemp. Torrey's amaranth *(Amaranthus torreyi)*, also a good producer, is known to be present in the northern counties west of the Arkansas River, but its exact range has not been charted. Spiny amaranth *(A. spinosus)* is of restricted local distribution and being only a moderate pollen producer is of only minor importance.

The two most active members of the chenopod family in Oklahoma are confined to the central and western part of the State. Russian thistle *(Salsola pestifer)* is a typical tumbleweed of the dry plains, much more conspicuous in dry years than in wet years. Its pollen is even more active than that of ragweed though not nearly so abundant anywhere. For many years it has been not only the dominant agricultural weed of the Great Plains area, but by far the most important source of allergenic pollen in Western Oklahoma.

Recently Mexican firebush *(Kochia scoparia)*, another tumbleweed, has become established in the Panhandle and western third of the State where it is now gradually replacing Russian thistle. Because of the high protein content of this weed (approximately two-thirds that of alfalfa) and its protective soil holding ability, it is being recommended by soil conservationists for use in the western part of the State and in eroded areas Like Russian thistle, it flourishes in saline soil such as that of the Cimarron River Valley It is rapidly moving east and south—now abundant in Oklahoma City. The pollen is fairly abundant but the grains are rather large and heavy. The allergenic role of the plant has not been fully de-

termined. Lamb's quarters *(Chenopodium album)* is a very common weed of all gardens and farms. Related species, such as *C. viride*, flourish in early summer, others in midsummer and late fall, but none is very productive of pollen For this reason they probably have only a minor impact on the allergy problems of the state. In air sampling it is difficult to differentiate lamb's quarters pollens from those of other *Chenopodiales* and because of overlapping seasons of distribution and similar appearance of pollen grains Similar antigenic qualities of the pollens also make it difficult to evaluate the clinical importance of any of the members of the group except Russian thistle and Mexican firebush.

Spring Weeds. Two minor sources of weed pollen in the spring and early summer are English plantain *(Plantago lanceolata)* and the docks *(Rumex spp.)* The former is not abundant enough to cause appreciable over-all air contamination, and few if any cases of specific sensitization are seen in this area The most productive dock is red sorrel *(R. acetosella)*, but the pollens of all docks are quite inactive as allergens. Pollen grains of these two types are easily differentiated from those of the grasses, so we can be sure from air tests that they are not distributed in appreciable amounts.

The Ragweeds. Ragweeds *(Ambrosiaceae)* of four genera and at least a dozen species are found locally or generally in Oklahoma Ragweed pollen (including that of all genera and species) is the most important cause of pollinosis in all parts of the State except the extreme west edge and the Panhandle. Even there, while certainly second to Russian thistle, it is still an important factor In the eastern half of the State common or short ragweed *(Ambrosia elatior)* produces most of the airborne ragweed pollen, while in the western half, western ragweed *(A. psilostachya)* is the chief offender. Giant ragweed *(A trifida)* is conspicuous, often abundant in low moist fields and waste "bottomland" throughout Production, per plant, is prodigious but in total probably less than the two above species Differentiation of pollen grains on air samples is impracticable Minor contributors to the ragweed problem of the

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Mucor, *Monilia* and *Rhizopus*, flourish in homes, barns and factories and are as important here as in other parts of the country.

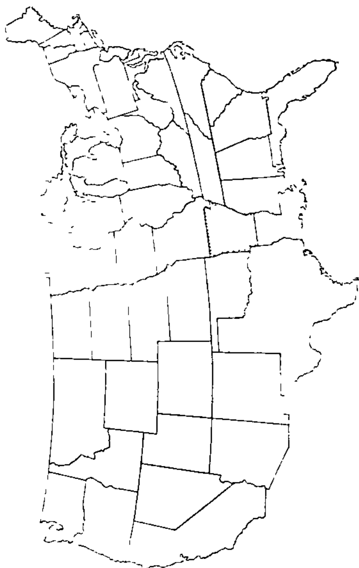
Rusts and smuts are abundant. Stem rust is a major menace to Oklahoma wheat growers, frequently threatening destruction of the crop. Atmospheric incidence of the stem rust uredospores is highest from April 15 to June 15. While allergists in other areas of heavy rust incidence seriously question the allergenic activity of rust spores, their high aerial incidence and wide prevalence in this state seem to merit careful local investigation. Smut spores of numerous species are doubtless a factor in this area They are so abundant in patches of Johnson grass and Bermuda grass in midsummer that clothing is often soiled from walking through the grass It is almost impossible to gather pure grass pollen of these species because of contamination with the ubiquitous smut spores.

The author here acknowledges the assistance of T. R. Stemen, M.A , of Oklahoma City both in personal communication and through perusal of his published botanical data.

eastern counties are southern ragweed *(A. bidentata)*, a prairie species of the Ozark region, and rough marsh elder *(Iva ciliata)* of moist land. Narrow-leaved marsh elder *(I. angustifolia)* is fairly common locally in Southern Oklahoma. Burweed marsh elder *(I. xanthifolia)* has invaded the State from the northwest and reached as far as Woodward and Clinton It prefers roadside ditches and moist places such as are suitable for giant ragweed. Present but probably unimportant in the western end of the State are poverty weed *(I. axillaris)* of saline prairies and bur ragweed *(Franseria tomentosa)*. Finally, the cockleburs *(Xanthium spp.)* must be reckoned with. Their pollen, though produced in very small amounts, as amply proved by air tests, is extremely allergenic, and the plants are widely distributed in farm land and waste places Direct local exposure to cocklebur pollen is possible but specific desensitization is probably unnecessary.

The sagebrushes *(Artemisia)*, or wormwoods, are close allies of the ragweeds since their pollens have very similar antigenic qualities. Various species are found throughout the State but mostly in the drier areas and only on virgin soil, except stray specimens of annual and biennial species. Sand sagebrush *(A. filifolia)* of the sandy parts of the Panhandle is probably the most conspicuous and important species, but prairie sage *(A. gnaphalodes)* and dark-leaved mugwort *(A. ludoviciana)* are much more widely distributed. Meager recovery of wormwood pollen grains on air samples indicates that as a group the wormwoods probably add very little to the discomfort of ragweed-sensitive persons

Molds and Other Fungi. Because of the large amount of wild grass, particularly Johnson grass, and cereal crops, the straw and foliage of which furnish suitable host material, and because of alternating periods of rain and dry, windy weather, the common soil molds flourish and disperse vast quantities of moderately allergenic spores. *Alternaria* and *Hormodendrum* spores are caught on test slides in appreciable to excessive quantity during the whole period from May to November. The environmental molds, such as *Aspergillus*, *Penicillium*,



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Arkansas

By Alan G. Cazort, M.D., and Thomas G. Johnston, M.D.

THE geography of the State of Arkansas is extremely varied with the Ozark Mountains in the northwestern part of the State to the flat Mississippi River Valley in the eastern part. Arkansas extends 250 miles north to south and varies from 175 to 275 miles east to west. The area is divided almost equally into lowlands and highlands.

The Arkansas River traverses the State from the northwestern to southeastern borders and the Arkansas River Valley is 25 to 35 miles wide with an elevation of 300 to 600 feet. In addition, there are many natural and artificial lakes, some reaching up to 100 square miles in area. Also, there are many rivers and streams making this state a fisherman's paradise. The Mississippi River forms almost the whole of the State's eastern boundary. Six peaks in the Arkansas highlands exceed 2,000 feet, the highest, Mount Magazine, rises to 2,823 feet.

The climate is that of a mild winter with a hot summer, however, there are four definite seasons of the year. The average temperature in January is 38° with the average in July being 80°. Snow occasionally falls with the ground being rarely covered in any area for more than three to four days at a time Sub-zero weather is seldom seen Summers are long with the growing season 180 days in the northwestern part of the State to 320 days in the southeastern part There is no "smog" and the air is clean even in Little Rock, the State Capital, which is the largest city.

The rice fields which occupied the Grand Prairie Area east and southeast of Little Rock have been extended to the northern part of the State. More than 100,000,000,000 gallons of

allergy for his patients and has been extensively quoted. In the experience of the author this is quite accurate, though over the years the earlier bloomers may vary considerably, owing to weather variations from year to year. We may have two or even three weeks of warm weather as early as February. This may be terminated by freezing weather lasting a day or so, but occasionally for considerably longer. Such cold blasts continue to assault us until April An elm coming into full bloom may be suddenly stopped, only to burst forth a week later Irregular rains play a very big part in determining the quantity of pollen in the air in various seasons

A relatively small number of trees account for most cases of tree pollinosis The first major hay fever factor to bloom is elm The pollen has been found on exposed slides as early as mid-January, though the second week in February is a more representative date Uninterrupted warm weather may terminate the season early in March, though the rule is prolongation to about the third week All the trees are heavy pollen producers, and elm grows profusely, wild, and on the streets As is the case with all trees, the northern part of the State is two to three weeks behind the southern

Cedar and arbor vitae cause trouble only in spotted areas They have almost the same period as elm but the season is shorter and is less influenced by weather. They start later and finish blooming earlier

Maples grow wild but are chiefly concentrated in the towns. Skin reactions occur in those patients who react to many spring pollens but evidence of clinical sensitivity to maples is rarely convincing.

Red maple *(Acer rubrum)* blooms in late February and early March It seems to depend much on insects for fertilization. Box elder *(Acer negundo)* is semi-wind pollinated. It produces a great deal of light, fairly dry pollen in late March and early April The trees are not numerous.

Large swamp areas in the bottom lands are covered with cypress *(Taxodium distichum)*. A few cases of cypress hay fever are seen in March and early April

Cottonwood *(Populus deltoides)* also grows profusely in the

ground water from 1,000 wells are used annually to irrigate the rice fields in the area mentioned above. Mold allergy seems very common in this state.

Precipitation varies from 45 inches annually in the highlands to from 50 to 55 inches in the lowlands.

There is little change in the diurnal temperature with the average daily change being 20°.

Humidity fluctuates from 45 to 60% with the high occurring in December and January, the low in July and August. Winds, gentle to moderate, are predominately from the southwest.

Social Structure. The State Capital, Little Rock, has a population of 150,000 in its greatest aspect and no other city has a population over 50,000. The State is chiefly agricultural with cotton, corn, rice, lumber, oils, fruits, cattle, poultry, and bauxite being the big industries

The health of the people seems excellent although there is a shortage of doctors in some of the rural areas. Churches are numerous and schools are good. Housing is no great problem as building materials are plentiful. Most of the heating is by natural gas.

As in most humid climates, house dust antigen is an extremely important factor in the production of allergic symptoms. Although it is a perennial allergen, a marked seasonal increase in house dust cases is seen in the fall. This starts with the first cool weather, when windows are closed, heavier bedding and clothing are taken from storage, and heat is turned on. The unvented gas heat generally used keeps the antigen circulating Many patients believe they are sensitive to the gas fumes.

Pollens. In spite of the fact that the region has large areas of forests, no part is a haven for pollen sensitive people Hot Springs National Park is surrounded for miles chiefly by wooded areas Yet, comparative pollen counts there and in Little Rock during ragweed season were not significantly different

Dr. J P. Henry, of Memphis, made the most complete pollen survey ever made in this area several years ago over two seasons. This is published in his book of information on

The male mulberry formerly was a popular shade tree. It grows rapidly and fence posts made from it were said to resist decay (probably termites). It grows profusely in many of the older sections of towns and is frequently seen in the country. The pollen is very small, dry, and abundant. It is produced through the latter half of April. It seems to be a potent sensitizer but most patients can obtain relief only a few miles from home—even on the other side of town. This is because of the uneven distribution of the tree.

Grasses start pollinating as early as February, increase through March, April, and May, and abruptly subside with hot weather in June. Many acute sufferers are completely relieved then, though grass pollen continues until November. Bermuda and Johnson grass start blooming in late May and continues, along with some other grasses, into November. Both of these seem to differ antigenically from other grasses and from each other. The authors have seen a few cases specifically sensitive to Bermuda only by every test one could apply. Possibly many grasses are more different antigenically than is commonly supposed.

Amaranths, including western water hemp *(Acnida tamariscina)* and chenopods, all occur in the region, but seem concentrated in only relatively small areas in sufficient quantity to cause hay fever. They bloom from early June to September. Only an occasional case of pollinosis is observed.

Ragweeds are of course a scourge of this and surrounding areas.

Short ragweed and giant ragweed grow in profusion in cultivated or waste areas throughout the state with local pollen counts comparable to those found in other parts of the ragweed belt. Southern ragweed *(Ambrosia bidentata)* mats the highway shoulders and large areas of flat pasture lands. Though not as evenly distributed, marsh elder *(Iva ciliata)* also occurs in abundance in some localities. The White River bottom in East Central Arkansas is covered with pure stands of it. All these ragweeds shed pollen simultaneously from mid August until about mid October. They do not bloom until frost as is commonly believed. If October is dry, atmospheric

river basins and along all creeks and rivers. The male tree produces a large amount of dry pollen but the season is short in any area. In the central (Little Rock) area the cottonwoods shed pollen in late March and early April. It is thought to cause some hay fever but most cases showing positive skin reactions are also quite sensitive to oak which causes a great deal more.

After elm, oak is the next major offender. Some trees begin to bloom in late March and others follow through April One tree blooms profusely for only a few days but individual trees in the same area may bloom two weeks apart. Oak grows everywhere. Pollen production is enormous. Only frequent rains can cause a light oak hay fever season. A greased slide exposed for 15 minutes may catch more oak pollen than one ever sees in a 24-hour ragweed exposure. Patients are rarely seen until suffering acutely during season. The degree of sensitivity frequently is acute, so great care must be exercised in giving the antigen

Pine (April into early May) competes with oak as a pollen producer. On still days pine and oak pollen may turn driveways yellow so that tire tread marks are as distinct as in light snow. Pine has been said by some not to cause hay fever. It has been called non-antigenic. The latter statement is not accurate True, the pollen is most difficult to extract, but Dr. Boggs, of Shreveport, Louisiana, and the authors both have seen proven cases of severe pine hay fever. The authors' case kindly submitted to conjunctival application out of season with immediate marked reaction in the exposed eye. One can only speculate as to why his secretions can extract the antigen. Pine sensitivity is *very* rare.

Wild hickories and pecan, a widely cultivated species of hickory, make a vicious combination Both grow profusely in various areas, wild, and as shade trees. The wild hickories pollinate through most of April while pecan starts in late April and May All hickory pollens are apparently antigenically identical Much of the long season is dry and windy Victims suffer intensely, usually with eyes and severe cough Treatment is difficult.

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Louisiana and the Gulf Area

By Vincent J. Derbes, M.D.

GEOGRAPHY. The southern parts of the Gulf States are flat lowlands In all except Louisiana and parts of Mississippi these lowlands are coastal plains, that is, old sea bottoms which by elevation have become dry land. The surface of Louisiana is a plain made mainly by the Mississippi River and its branches in the form of delta and flood plain deposits. In Louisiana the flood plain merges into the delta which forms the southern part of the state. Along the Gulf coast is a beach of white sand, best developed in Mississippi and Alabama, north of which is a low marshy tract most extensive in Louisiana Bayous are characteristic, especially of the coastal regions, and are commonest in Louisiana Several small and shallow indentations form bays (St. Louis, Biloxi, Pascagoula) Above the coastal marshes lie prairies, bluffs, and pine hills The highest elevation in Louisiana is 400 feet (average 75 feet), in Mississippi the highest elevation is 800 to 1000 feet along the Pontotoc Ridge, which gradually slopes east to the Appalachian Mountain System. In Alabama the highlands average 700 to 800 feet but range to 1800 feet

Climate. The climate of the Gulf Coast States is semitropical and exceptionally equable over large areas. The southern latitude, low elevation and proximity to the Gulf of Mexico are material factors The marine tropical influence may be appreciated when it is realized that the average water temperature of the Gulf along its northern shore ranges from 64° in February to 84 in August (*Yearbook of Agriculture*). Mean annual temperature is 70° in Louisiana, 64° in Mississippi and 63 in Alabama The mean temperature for July, generally the hottest month, is comparatively uniform varying

contamination may persist with accompanying aggravated symptoms until November. Acute cases obtain relief after the first hard rain after the second week of October. The antigenic quality of marsh elder pollen is similar but not identical to that of the other ragweeds.

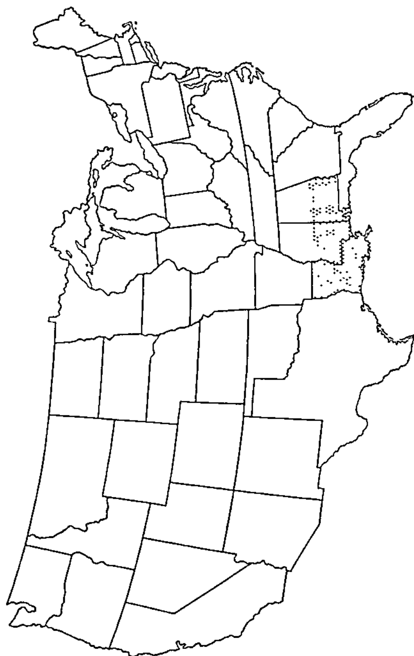
The ragweed season shades into the house dust season. Combined ragweed-house dust sensitivity is very common and usually means asthma.

Scrub elm *(Ulmus crassifolia)* blooms in September but is more of a botanical curiosity than a menace. It causes only a few days of discomfort in occasional cases.

TABLE I
CLIMATE

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct.	Nov.	Dec.	Annual
Normal Mean Temperatures	54.2	57.3	62.8	68.8	75.4	80.6	82.4	82.2	79.2	71.0	61.6	55.6	69.3
Average Precipitation (Inches)	4.31	4.25	4.75	5.24	4.60	5.88	6.37	5.80	5.03	3.30	3.14	4.79	57.46
Average Number of Days with 0.01 Inch or More of Precipitation	10	9	9	7	9	13	15	11	10	7	7	10	120
Average Percentage of Possible Sunshine	49	51	57	63	65	61	58	58	65	69	60	45	59
Average Hourly Wind Velocity	8.6	9.0	9.0	8.7	7.7	7.0	6.7	6.6	7.5	7.9	8.2	8.4	7.9
Average Relative Humidity	75	73	71	70	69	70	74	74	72	70	72	75	72

Source of Data United States Weather Bureau



where in the country, though with the increasing economic well being of the area this too is being improved. Moreover, there are numerous excellent private schools. Universities are good though not among the top five in the nation.

Opportunities for employment are steadily increasing. At present work is available for all at good wages. By contrast cost of living is lower here than elsewhere and the last federal survey placed New Orleans in the favored position of least expensive city in the country.

Housing is generally available and becoming more so because of an unprecedented building boom in the area. Coal, petroleum and natural gas are used for heating. The prevalence of oil in the region has led to continued increase in use of natural gas, which is almost a perfect fuel for this purpose.

The paucity of snow excludes winter sports to a large extent. The mild climate, however, permits golf, tennis, horseback riding, baseball, swimming, bowling, boating, fishing, and hunting practically the year around. Mardi Gras is celebrated in New Orleans and Mobile, there is racing at the New Orleans Fair Grounds, Mid Winter Sports Carnival ending with the Sugar Bowl Football Game, Spring Fiesta as well as plantation tours, boat races, tarpon rodeos and many special recreational activities throughout the area. New Orleans City Parks cover almost 2,000 acres and Lake Pontchartrain's seven and one-half mile beach and amusement park are enjoyed the year around. The New Orleans Recreation Department is one of the most famed in the country.

Allergenic Factors. In regard to the inhalant allergens, aside from such perennial factors as house dust, animal danders and the like, four seasons may be identified. The earliest of these is the tree season, tree pollen permeates the air throughout much of the winter and spring in Louisiana and the coastal area with pollination periods somewhat later, that is, February, in the more northern portion of Alabama and Mississippi. Pecan, oak and elm are most prevalent with cypress and maple secondary. Although there are tremendous numbers of pine trees throughout the region, respiratory allergy from pine

only from 81° to 83°; the temperature in January, the coldest months, varies from 46° in the extreme north of Louisiana to 43° in the extreme north of Mississippi and averages 51° in the coastal area of Louisiana, Mississippi and Alabama Snow fall is rare throughout the area, averaging two inches a year. By contrast there is considerable rainfall—from 50 to 55 inches a year. Thunderstorms are common during the summer months but are not often severe and are only occasionally accompanied by hail. Dense fog occurs occasionally near daybreak but is generally dissipated early in the forenoon. High humidity is prevalent and in the coastal area the mean range is from 65% to 70%

Social Structure. In the main the Gulf Coast Region is agricultural but there are notable industrial exceptions; for example, Birmingham, Ala, and New Orleans, Baton Rouge, Shreveport, and Lake Charles, La The amount of industrialization in the South generally is rapidly increasing. In the 1940 census, Louisiana was 58 5% rural, Mississippi 80 2%, Alabama 69 8% The vast majority of people in the section are native born (Louisiana, 98.8%, Mississippi 99.7%; Alabama 99 6%). In the 1940 census the white population in Alabama was 65 2% of the total, in Louisiana 64%, and in Mississippi 50.5%. The non-white population is for practical purposes all Negro There has been considerable emigration of Negroes in recent years and these numbers probably exaggerate their true percentages. The Negroes are heavily concentrated in certain rural parts of Mississippi and Alabama.

The white people of Alabama, Mississippi and the northern half of Louisiana are largely of Anglo-Saxon or Scotch-Irish stock, and Protestant. In the southern half of Louisiana the dominant white racial group is primarily French and Catholic. French is spoken in much of the Acadian area of Louisiana There are still Negroes who speak no English, having been born and reared among French speaking Acadians. The French influence is apparent in the cooking as well as in numerous facets of life.

The public school system in general is not as good as else-

bama but except along the Gulf there seemed to be less marsh elder According to him, in Vicksburg, Mississippi, about 10% of the fall pollen is contributed by fall blooming elm. On the Mississippi Gulf Coast, for example, Biloxi, where the prevailing breezes are southerly, there are much smaller amounts of ragweed than inland, even such a short distance as New Orleans. On the coastal islands, the remains of a barrier reef (Horn, Ship, etc), there is almost no pollen. At present these islands are not commercially developed as resort areas and can be inhabited only under rough camping conditions.

Large amounts of seafood are consumed by the inhabitants of the states bordering on the Gulf. Those causing allergic symptoms most often are shrimp, crabs, oysters and crawfish; panfish and deepwater fish cause less but nevertheless appreciable difficulty affecting particularly the skin and gastrointestinal tract. Strawberries, okra and other seasonal fruits and vegetables, some of which are tropical, such as, chocho or vegetable pears, cherimoya, papaya and mango, may cause urticaria, gastrointestinal symptoms or contact dermatitis. Among the many contactant irritants may also be mentioned poison ivy, ragweed, Parthenium hysterobius and fig latex.

pollen is rare or nonexistent. Among the grasses, Bermuda seems to cause the most trouble, followed by Johnson grass The pollinating period is lengthy, but conspicuous amounts of pollen are not discharged into the air perhaps because the lush growth does not require it to be carried great distances Dur-

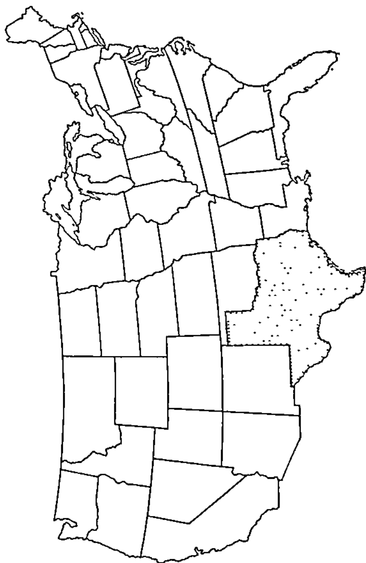
TABLE II

POLLEN RECORDS FOR 1950
IN POLLEN GRAINS PER CUBIC YARD

(Monthly Totals)
New Orleans, Louisiana

	Jan.	*Feb.*	*Mar.*	*Apr.*	*May*	*June*	*July*	*Aug.*	*Sept*	*Oct.*	*Nov*	*Dec.*	*Total*
Oak		175	815	11									1001
Elm		440	36										476
Pecan			152	239									391
Grass				12	31	46	40	51	39	28	31		278
Ragweed							8	258	988	190	40		1484
Maple		26	63										89
Cypress	106	11											117
Sycamore		12	138	22									172
Alternaria	17	29	46	68	90	211	192	240	309	88	60	21	1371
Hormodendrum	11	14	22	28	101	170	157	196	176	120	46	18	1059

ing the summer months from May until the first cool snap of the fall an unknown offender is in the air throughout the Coastal Plains area Large numbers of people have hay fever from it (nasal obstruction is a more prominent feature than the usual sneezing, itching and rhinorrhea), a smaller number have asthmatic symptoms Best evidence suggests that one of the airborne fungus spores, probably one of the obligatory plant parasites, is the allergen In the fall the ragweeds seem to be the worst offenders. Durham's surveys showed that in New Orleans and along the Mississippi River northward rough marsh elder and giant ragweed are of equal and outstanding importance. Durham found that 85% of the pollen in the air in New Orleans during the summer and fall is from ragweed, about 10% from composites and most of the remainder from fall grasses. He found similar pollens in Mississippi and Ala-



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Texas

By J. Harvey Black, M.D., and L. O. Dutton, M.D.

GEOGRAPHY. Texas is distinguished by its great size. It has an area of 263,644 square miles of land and 3,695 quare miles of water surface, a total of 267,339. The longest traight line distance in a north-south direction is 801 miles The greatest east-west distance is 773 miles. In elevation the State varies from sea level to 8,751 feet. Its northernmost oundary abuts Colorado while its southern tip is as far south s the tip of Florida Because of this vast extent and the great lifference in elevation, the climate varies from the north temerate to the subtropic.

The surface of Texas is generally a rolling plain with gradal descent from the Great Plains to the Gulf Coast. It extends ke a great amphitheatre from the Gulf Coast northwestward vith its upper levels on the high plateau of the "Panhandle" nd the mountain ranges of the western area. Physiographicaly it may be divided into four great regions: (1) the Coastal Plains extending into the state from the east, (2) the North Central Plains, (3) the high Western Plains, and (4) the Trans-Pecos Region which is traversed by the eastern ranges f the Rocky Mountains.

The Coastal Plains include that area from the Rio Grande River near Del Rio to San Antonio then to Austin then north nd east to the Red River going east of Dallas In the lower Rio Grande Valley is the so-called "Magic Valley" devoted to itrus fruit and winter vegetables with increasing production f cotton. There is farming and truck growing near Corpus Christi and little other cultivation except where irrigated. Northeastward are the Coastal Prairies covered with grass nd some woodland. Some vigorous cities are located along

State is 66° with a mean growing season of about 240 days. On the east at the Louisiana border the mean annual rainfall is 56 inches while in the extreme west it is about eight inches. The mean annual precipitation for the entire State is 30 plus inches

The weather most peculiarly Texan is the "Norther," the north and northwest wind which sweeps over the northern and central portions of the State at irregular intervals in winter. They come down with high barometric pressure out of the Rocky Mountain area causing abrupt drops in temperature. The dust storms in West Texas are infrequent and not now so severe as formerly. Snowfall is practically negligible except on the High Plains of Northwest Texas where the maximum fall is about two feet annually. The percentage of possible sunshine varies from about 60 along the Gulf coast to about 80 in El Paso. The average annual relative humidity at noon Dallas 52, Houston 59, El Paso 31 and San Antonio 54

The time of the last killing frost in the spring and the first in the fall are of interest As examples.

	Last in Spring	*First in Fall*
Amarillo	Apr 14	Nov 1
Dallas	Mar 18	Nov 23
Houston	Feb 5	Dec. 11
El Paso	Mar 19	Nov 16
San Antonio	Feb 24	Nov 30

The Commercial Activities are as varied as the weather. Farming in East Texas consists chiefly of truck farming, fruit and rose culture, peanuts, soy beans, yams and is becoming increasingly interested in cattle raising. The North Texas blackland produces cotton, grain and cattle. Central and West Texas raise much cotton and small grains and cattle. The Gulf Coast produces cotton, rice, truck farming and cattle. The Rio Grande Valley, in its lower reaches, is noted for its citrus fruits and winter gardens.

the coast and oil and sulphur are important products Leaving the coast and extending parallel with the Louisiana border there is much pine and some walnut, hickory, gum and pecan trees. Lufkin is growing as the result of paper manufacture using the large pine growth. The western part of this area is the "Black Land," a fertile agricultural region. Seventy five per cent of the people in Texas, living in cities of more than 10,000, live in this area and a narrow strip along the coast.

The North Central Region is largely prairie with some timber in the east, largely pecan and other hard woods West there is oak, mesquite and, on the hills, a great deal of cedar.

The High Plains lie at the base of the Rockies. The "Staked Plains" occupy the "Panhandle" of the State. A slightly rolling plain 2,500 to 4,300 feet above sea level. The South Plains are somewhat similar but several hundred feet lower. This area gradually drops south and east as a prairie which becomes quite rough in the south and is called there the "Hill Country."

West of the Pecos River is a high plateau traversed by mountains which are a part of the Rockies In the northern part is a high plain 2,000 to 4,000 feet. With the southward swing of the Rio Grande some very striking mountainous country is found Here there is yucca, lechuguilla, greasewood, ocotillo, cacti, guayule, candillila and some coarse grasses. Pine, oak and junipers are in the mountains In the Davis Mountains cattle raising is the principal industry. Pine, oak and other timbers are in the mountains. In the Guadalupe Mountains are pine, oak, Douglas fir and other Rocky Mountain forest trees.

Climate. The diversity which characterizes Texas Weather is due to. (1) the geographic position between the warm Gulf waters and the Rocky Mountain system, (2) the north-south range of about 800 miles and (3) the wide range in elevation. The Rio Grande Valley in extreme south Texas has an annual mean temperature of about 74° and an average growing season of more than 300 days. In the Panhandle the mean annual temperature is 56° and the average growing season about 190 days The mean annual temperature for the

which cause hay fever often enough to be of importance. Cedar (*Juniperus sabinoides*) is abundant throughout Central and West Texas. In the northern area it blooms from the last week of December or the first of January and blooms until mid February. In the south, pollination is one or two weeks earlier. This pollen is particularly important to the allergist about Austin. Elm (*Ulmus americana*) blooms in February but there is also a fall blooming elm (*Ulmus crassifolia*) which blooms about the first three weeks in September and complicates the picture during the ragweed season. Hay fever in April from pecan (*Hicoria pecan*) is not very common and oak (*Quercus spp.*) causes little trouble. Ash (*Fraxinus americana*), Box elder (*Acer negundo*), *Cottonwood* (*Populus deltoides*), Hackberry (*Celtis occidentalis*), *Sycamore* (*Platanus occidentalis*), and Willow (*Salix spp*) all bloom in March and are infrequent causes of hay fever or asthma. Pine is very abundant in Easternmost Texas but never causes hay fever.

A large variety of wild grasses may be found over the State but with the exception of Bermuda (*Cynodon dactylon*) and Johnson grass (*Sorghum halepense*) are of little importance. Sudan grass (*Andropogon sudanensis*) is a hay crop which seems to cause little or no trouble. Bermuda is widely distributed and has been much used as a lawn grass. Johnson grass is very abundant in the eastern half of the State and, with Bermuda, blooms from early in April to June or July. As soon as it gets hot and dry in midsummer grass pollination stops. In the southern part of the State grass may bloom throughout the year.

Of the weeds, ragweed is by far the most important. It is found all through the east and central part from the north border of the State to the coast. Both giant (*Ambrosia trifida*) and short (*Ambrosia artemesiafolia*) ragweed are abundant. Southern ragweed (*Ambrosia bidentata*) is found only in the northeast corner of the State. False ragweed (*Franseria*) is not of any importance in the east half of the State. Pollination of ragweed begins the last week of August or the first week in September and persists through a great deal of October except in the southern part of the State where it blooms a

The Coastal Area produces much oil and sulphur. Fishing is quite important and shipping is heavy in several ports. Cattle are raised in the southern nad western part of this area.

Oil is found in three-fourths of the counties in the State and, with natural gas, is a chief source of the State's wealth. Iron is found in East Texas and there are large steel plants at Daingerfield and Houston.

Jobbing, insurance and banking are major activities in the larger cities.

The Population of the State is approximately evenly divided between urban and rural people. The racial groups are fairly numerous with the Negro and Mexican populations quite large and German and other Central European groups represented. The Mexican group is most numerous along the Texas-Mexican border but a great many have moved to the northern and western parts of the State. Negroes are most numerous in East Texas and there are few in the western part of the State. Some towns, particularly in the southwest were settled by German families and have retained their character until now. The larger cities of the State have had a considerable migration in recent years from the north and the air of these cities is neither southern nor western but rather cosmopolitan.

Both urban and rural areas are well supplied with churches and schools Colleges and universities of recognized quality are found in the larger cities and medical schools are in Galveston, Houston and Dallas. The cities are clean because of the use of natural gas as fuel The homes are built with climatic conditions in mind. Air conditioning is found generally in offices and stores and in many homes. Small homes frequently use small gas heaters many of which are not vented. Floor furnaces and attic fans are common and have to be considered in their effect on the allergic person.

POLLENS AND OTHER ALLERGENS IN EAST TEXAS

By J. Harvey Black, M.D.

The Pollens of importance in East and Central Texas are not many. There are two trees largely peculiar to these areas

In the southeastern part of the State there are frequent cases of mid-summer hay fever for which no cause has been found It has been reported along the Gulf Coast in Alabama, Mississippi and Louisiana as well as in Texas. It seems to be limited to the coastal region It is definitely seasonal, behaves like a pollen allergy, but its etiologic agent has not been found.

(The accompanying figure shows the approximate pollination periods of the pollens mentioned)

Molds have been reported by Prince and others as of major importance in the coastal region In north Texas we have not found them of any significance Where they are believed to be of etiologic importance, *Alternaria spp* are believed to be the chief offender Rusts and smuts have been found only in isolated instances to cause trouble and this usually in grain *brought in from the north*

There are some miscellaneous and occasional causes of allergic conditions which deserve mention.

Cotton pollen causes no trouble but the cotton fiber exposed in the field collects a great deal of pollen and patients sensitive to the wind borne pollens will develop hay fever occasionally while picking cotton, and always when in the dust in a cotton gin Particularly in the western part of the State, the whole boll is pulled from the stalk and, at the gin, the fiber is separated and the boll burned During the fall when the gins are operating continuously, the smoke may be quite heavy and some patients have severe hay fever or asthma from it Just what it is in the smoke which causes the reaction has not been determined.

Wheat, oats, rice, barley, rye and corn are all Texas crops but cause no trouble save as they may be covered with dust and wind borne pollen and may cause trouble on that account when threshing or otherwise handling the grain

Clover, alfalfa, sorghum, sugar cane, hairy vetch, all have been suspected but seldom proved to cause any allergic reactions.

Pollen of the citrus trees is of no importance.

Peanuts are an important crop in the east and some parts

little later and persists somewhat longer. In the Rio Grande "Magic Valley" ragweed may bloom early in the summer but is not so important as it is further north The counts of ragweed pollen in Dallas have been extremely high:

1946	1947	1948	1949	1950	
13523	21810	25543	20338	19155	Maximum count 1950–1606

Since killing frost does not occur anywhere through the eastern half of Texas until well into November, the ragweed sea-

POLLINATION PERIODS, EAST TEXAS

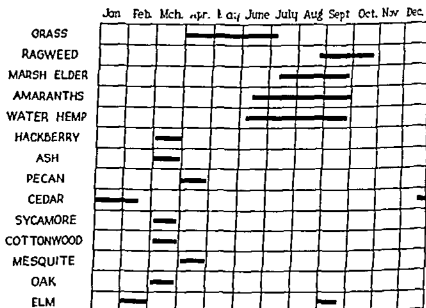


Fig 1.

son stops gradually and not abruptly as it may in the north of the U. S. Rough marsh elder *(Ica ciliata)* is important in the coastal area but no marsh elders are of major importance elsewhere.

The Amaranths are only occasional causes of hay fever in the eastern half of the State and western water hemp *(Acnida tamarascina)* is of no importance

"flats," bounded by rather rugged, rocky mountain ranges, the highest of which approach 9,000 feet. Many are between 5,000 and 7,000 feet in altitude.

At the present time most of these "flats" are populated by a semi-desert type of vegetation, although some are rather heavily covered with native grasses Most of the lower slopes of the mountain ranges are well covered with native grasses, and the higher slopes of the mountains have numerous stands of pine, spruce, mountain cedar, birch, oak, and various other trees in smaller numbers and in scattered locations. With the exception of the cedar, none of these mentioned plants constitute any serious hay-fever problem Throughout this area, there are scattered small towns and villages, and small settlements around ranch headquarters. In these areas there has been an introduction of Bermuda grass, Johnson grass, Russian thistle, various members of the amaranth group, mainly Palmer's amaranth, and scattered areas of western and short ragweed There are numerous stands in these populated localities of cottonwood trees, elm, mainly the Chinese elm, and Arizona ash. There are also some mulberry trees, but not nearly so numerous as the others mentioned There are also considerable stands of the atriplex group of salt bushes, and in a few localities considerable amounts of lamb's quarters are found All of these plants, of course, contribute definitely to the hay-fever problem in their respective localities Due to the rapidly changing altitudes and topography, various life zones are closely adjacent to each other, and one may rapidly pass through several distinctive botanical areas in the course of a few miles

In the extreme western tip of the State, the Rio Grande Valley is an irrigation project, extending for a length of about 165 miles from north of El Paso to southeast of El Paso, with this city being in the approximate center The valley's width varies from two or three miles to 12 to 15 miles, and this area is heavily cultivated The principal crops are cotton, alfalfa, and truck farming More recently, the Pecos River Valley itself has been irrigated with a somewhat similar crop list. A

of Central Texas and the hay may be fed to milk cows. We know of instances where it appeared in the milk in sufficient quantity to cause asthma in the sensitive patient.

Tyler, in East Texas, claims to be the center of the world for rose growing. Hay fever or asthma from rose pollen has not been reported.

Flax is now being grown in some coastal areas. It does not seem to cause any allergic reactions.

In those areas in the State where cattle, sheep, goats and poultry are raised, these must be kept in mind as etiologic agents.

In areas of gas production, especially where "sour" gas is found, there may be sufficient air contamination to be a source of irritation

Contact Eczema from industrial contacts constitutes an occupational hazard here as elsewhere. In the farming areas contact with weeds is a rather common cause of dermatitis. Poison ivy is the most common but parthenium, ragweed, cocklebur and marsh elder are fairly frequent while others are occasional offenders.

(For a great deal of the foregoing information, we are indebted to the *Texas Almanac,* 1950. A. H Belo & Co., Dallas.)

POLLENS AND OTHER ALLERGENS IN WEST TEXAS

By L. O. Dutton, M.D.

The Area West of the Pecos, known as the Trans-Pecos Country, presents a rather abrupt change from the remainder of the State The area is irregular in shape, the longest east-west distance being about 215 miles from the Pecos River to the extreme western tip of Texas. The north-south distance is somewhat greater than this—from the Rio Grande Valley to the northern boundary between Texas and New Mexico The enclosed area constitutes the western pointed tip of the State. From the Pecos River westward the terrain becomes quite irregular and increasing in altitude In general, the physiogeographic features consist of broad valleys, generally called

The climate of El Paso and vicinity may well be taken as representative. This is characterized by abundant sunshine, fairly wide temperature ranges, low humidity, and sparse rainfall. General average rainfall is about nine inches per year, and a considerable part of this occurs during the months of July and August, and January and February. There may be long periods with no rainfall at all. This is, of course, insufficient to sustain plant growth, with the exception of desert plants, and irrigation is uniformly used for crops, gardens, and lawns There is generally little snow in the winter, and that which does fall is rapidly dissipated

The summer temperatures are high, there being about 90 days per year in which the temperature is 90°, or above. There are generally a few days, from five to 10 per year, when the temperature rises to above 100° However, as a rule during this time the relative humidity is extremely low, and those high temperatures are not so uncomfortable as they are in localities where relative humidity is high For a large part of the summer, the relative humidity will be between 10 and 14%, and rarely goes above 24% This low humidity makes it possible for homes and buildings to be cooled with evaporative air coolers, which is an economic and efficient manner of making buildings considerably more comfortable. As a rule, the night time temperatures are quite cool and comfortable, even during the hottest weather of the summer. In winter, the day time temperatures are generally mild, but the night temperatures will drop below freezing about half of the time in December and January Temperatures lower than 10° occur only infrequently

The most uncomfortable aspect of the weather in this entire area is the occurrence of sand storms The soil surface, generally being dry and loose, with sparse natural vegetation, moderately strong winds may raise a great deal of dust and blow it for long distances. In general, these sand storms occur in March or April, and are only of infrequent occurrance at other times of the year

On the whole, the climate is quite equitable, generally pleasant, and the low humidity seems to be generally helpful to

few areas in the last several years have been irrigated from deep wells, and some of these rather desert-like "flats" have been converted to quite fertile farming areas.

In all of these areas, where the soil has been disturbed, the hay-fever producing weeds listed above have rapidly taken over the fence rows and the ditch banks.

In the immediate vicinity of El Paso, the principal pollen offenders are as follows: For the spring season cottonwood, elm, ash, and mulberry are offenders. For the season from mid April to frost, Bermuda grass and Johnson grass throw intermittant clouds of pollen into the air. Successively later in the season, the salt bushes, Russian thistle, the amaranth group, and the ragweed group add their quota of pollens, and all of these pollinate until late October of early November, when, on the average, the first frost occurs If the frost happens to be particularly late, the amaranth group will die off before frost, while the remainder of these persist in pollinating until frost.

In that portion of the irrigated valley, west and north of El Paso, there has been developed a considerable pecan industry, with hundreds of acres devoted to cultivated pecans. These trees have been planted within recent years, and are now reaching a growth where we see increasing amounts of pecan pollen in the air, and increasing numbers of pecan pollen hay-fever cases. There is also some sugar beet raised in this valley for seed purposes. These start pollinating in June for a period of several weeks. It is an extremely toxic pollen, producing violent hay-fever in those who are sensitive to it. For economic reasons, however, this crop is on the decline in this locality.

The general climatic features of this entire area are fairly uniform, with the exception that at the higher levels in the mountain ranges there is, of course, a lower general temperature. There is more rainfall in the summer and more snow in the winter. However, for those areas at lower altitudes where the cities and towns are located, there is relatively little difference in average temperatures and humidity, or other climatic features.

PART III
WESTERN SECTION

Area	*Author*
26. Eastern Oregon and Washington, Montana, Idaho, Nevada, and British Columbia	Robert F E. Stier, M.D.
26a Alaska	Robert F. E Stier, M.D.
27. Pacific Northwest	Frank Perlman, M D.
28 Colorado, Eastern Wyoming, and Western Nebraska	Frank T. Joyce, M.D.
29 Utah and Western Wyoming	Dean A. Moffat, M.D. George A Peck, M D.
30 New Mexico	T E Kircher, Jr, M.D.
31. Arizona	*Earle Wood Phillips, M D*
32 Northern California	Albert H. Rowe, M.D.
33 Southern California	George Piness, M D.
34 Mexico	M Salazar Mallen, M D.

many asthmatics and upper respiratory difficulties Perhaps, the most favorable feature of the climate is the high percentage of sunshine, there being very few days which are not clear. Heliotherapy is almost automatically a part of being in this area.

The principal industries, other than the farming mentioned, are cattle raising, lumbering, mining, and the production of oil. There is a growing trend in the El Paso area toward industrialization, principally smelting, and there is considerable free intercourse between El Paso and Mexico through the official El Paso-Juarez Port. The entire area abounds in scenic attractions and historical points, dating back to the earliest days of the exploration of the North American Continent. In most respects, considerable area south of the border in Mexico, and about the southern one-fourth of the State of New Mexico, present identical features with those above described.

26

Eastern Oregon, Washington, Montana, Idaho and Nevada

By Robert F. E. Stier, M.D.

EASTERN OREGON

GEOGRAPHY. The territory to be considered lies between the east slope of the Cascades, extends to the Idaho State border on the east, Washington on the north and Nevada and California on the south

In the northeastern part of the State rise the Blue and Wallowa Mountains, ranging from 1800 to over 10,000 feet. In the central part of the State is the Klamath country, a region of beautiful lakes and streams In the southeastern part of the State in contrast, is a semi-arid, upland plateau, broken by low barren mountains and buttes

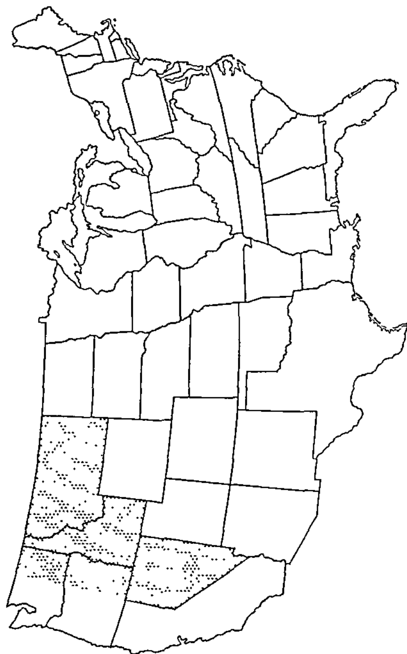
Climate. The climate of this area of Oregon is seasonal. In the mountain areas, cooler temperatures will prevail However, the mean normal temperature is about 45°. The extreme temperatures recorded are 103° to minus 20°. The mean normal summer temperature is 49° while the mean normal winter temperature is about 28° The average relative humidity is 58% During the summer, the average relative humidity is 40% while the winter average is 72% The percentage of days with sunshine is about 65 The precipitation for this area is reported as 10 8 inches Heavy fog occurs on an average of seven days during October to February. None at other times of the year.

Social Structure. Agriculture, lumbering and mining make up the principal industry of this portion of the State In agriculture, the valleys and plains furnish opportunity for grain

TABLE I

HAY FEVER PLANTS IN OREGON EAST OF CASCADE MOUNTAIN RANGE

Pollen	Prevalence Eastern	Prevalence Central	Time of Pollination
Trees			
Alder (*Alnus spp.*)	++	+	March-April
Ash (*Fraxinus oregona*)	–	+	April
Aspen (*Populus tremuloides*)	+	+	March-April
Birch (*Betula spp.*)	++	+	March-April
Black cottonwood (*Populus trichocarpa*)	+	+	March-April
Black locust (*Robinia pseudo-acacia*)	+	+	May-June
Box elder (*Acer negundo*)	+	+	March-April
English walnut (*Juglans regia*)	++	+	May-June
Garry's oak (*Quercus garryanna*)	–	+	April
Hazelnut (*Corylus californica*)	–	+	March-April
Juniper (*Juniperus occidentalis*)	–	++	March-April
Willow (*Salix spp.*)	+	+	February-March
Grasses			
Annual June (*Poa annua*)	+	++	May-September
Blue bunch (*Agropyron spp.*)	+	–	May-June
Canada blue (*Poa compressa*)	++	+	May-September
Giant rye (*Elymus condensatus*)	+++	–	June
Italian rye (*Lolium multiflorum*)	–	++	May-July
Kentucky blue (*Poa pratensis*)	++++	++	May-September
Koelers (*Koeleria cristata*)	+	+	June-July
Orchard (*Dactylis glomerata*)	++	+	May-June
Perennial rye (*Lolium perenne*)	–	++	May-July
Quack (*Agropyron repens*)	++	++	June-September
Red top (*Agrostis alba*)	++	+	June-August
Smooth brome (*Bromus inermis*)	++	+++	May-June
Sweet vernal (*Anthoxanthum odoratum*)	–	++	April-May
Tall oat (*Arrhenatherum elatius*)	–	++	May-June
Timothy (*Phleum pratense*)	++	++	June-July
Velvet (*Holcus lanatus*)	–	++	May-July
Western wheat (*Agropyron smithii*)	+	++	May-June
Wild rye (*Elymus glaucus*)	–	+	June-July
Weeds			
Atriplex (*Atriplex spp.*)	++	++	July-September
Bitter dock (*Rumex obtusifolius*)	–	+	May-September
Common sagebrush (*Artemisia tridentata*)	+++	+++	August-September



agricultural products In the grain belts, the grain smuts and wheat chaff may become additional factors to those of the local pollens Alfalfa hay used in feeds may prove to be more of a factor than the alfalfa pollen. Specific sawdust sensitizations must be considered in saw mill areas.

Pollen and Mold Survey. The pollen make up of this area is dependent upon the geographic make up of the area In the lower valleys and dryland areas, the grasses pollenate during late April and early May but depending upon the amount of moisture, most will finish their pollination during June. In the higher altitudes they pollinate later and continue into the early summer In the dryland areas, particularly in the southeastern, northeastern and the broad valley at the foot of the Cascades from The Dalles south through Bend, Klamath to almost the California border, many of the dryland weeds as Russian thistle, the sagebrush, poverty weeds, etc. are very abundant. These weeds are rarely found west of the Cascades Patients who are sensitive to these weeds and find it necessary to stay east of the Cascades during the summer must be desensitized. As in Eastern Washington, these weeds are seldom found in the higher altitudes

EASTERN WASHINGTON

Geography. The territory to be considered is bounded on the west by the east slope of the Cascades, on the east by the Idaho State boundary, on the north by British Columbia and by Oregon on the south The northeastern and southeastern parts of the State are quite mountainous with deep and comparatively narrow valleys. The mountains range from an elevation of 1,000 to 8,000 feet. The central part of the State is a vast basaltic plateau Here several large irrigation projects have been completed and the waters from the Columbia River at the Grand Coulee Dam will irrigate ultimately about 1,000,000 acres.

In the central and parts of the southeastern portion of the State, the rolling hills are covered with productive soil and here wheat and peas are largely raised. Some rye, oats, barley,

TABLE I *(Continued)*

Pollen	Prevalence Eastern	Prevalence Central	Time of Pollination
Dandelion *(Taraxacum taraxacum)*	++++	++	April-November
English plantain *(Plantago lanceolata)*	++	++	May-September
False Ragweed *(Franseria acanthicarpa)*	+	+	August-September
Lamb's quarters *(Chenopodium album)*	+++	++	June-September
Mugwort *(Artemesia vulgaris)*	+	+	July-September
Nettle *(Urtica lyallii)*	+	+	June-July
Rough redroot pigweed *(Amaranthus retroflexus)*	+++	+	June-September
Russian thistle *(Salsola pestifer)*	+++	+++	July-September
Sheep sorrel *(Rumex acetosella)*	++	++	May-September
Yellow dock *(Rumex crispus)*	-	+	May-September
White sagebrush *(Artemisia ludoviciana)*	+++	-	July-September

Symbols Showing Relative Abundance of Hay Fever Plants

++++++ The most abundant	+++ Common
+++++ Very abundant	++ Occurs in isolated patches
++++ Abundant	+ and without symbol, scarce

The dates of pollination are approximate They vary with location and season.

crops, most important being wheat. The mountains and valleys give excellent summer range for sheep while the lower river and creek valleys furnish good grazing land for cattle Much virgin timber still remains in the north central and northeastern portion of the State and therefore, lumbering is an important industry In the Blue Mountain Region, gold, silver and copper are mined. Manufacturing is confined to flour and woolen mills in the Pendleton-LaGrande Areas

Educational facilities are confined to the Eastern Oregon College of Education at LaGrande.

In the beautiful mountains and valleys of eastern Oregon, near Pendleton and Baker, there is excellent fishing and hunting. Many dude ranches have been established in this area, capitalizing on the natural recreational facilities

Special allergenic factors in this region would pertain to the

and dairying is also very important in many areas. Apple, soft fruits and hops are the major crops in limited areas centered around Yakima and Wenatchee. Lumbering and mining are most important in the area northwest and east of Spokane.

Due to an abundance of electricity from Grand Coulee, Bonneville, and other minor dams on the Columbia River, products depending upon electro-chemical methods are produced in this area Spokane has a large aluminum and magnesium rendering plant with a large aluminum rolling plant in the same vicinity. Flour is milled in the Spokane Area and here several large mills are located.

Educational facilities are found in Spokane as Gonzaga University (Roman Catholic), Whitworth College (Presbyterian), Holy Names College (Roman Catholic), at Ellensburg, Central Washington College of Education, at Pullman, State College of Washington, at Walla Walla, Whitman College, the oldest college in Washington and Walla Walla College (Seventh Day Adventist), and at Yakima, Yakima Valley Junior College

The largest city in this area is Spokane with a population of about 175,000 It is the medical center for the area and has excellent general hospital facilities and a recently established Veterans' Administration Hospital Other larger cities are Walla Walla, Yakima and Wenatchee

In the grain farming areas, consideration must be given not only to the specific animal and pollen factors but to the occurrences of grain smuts and rusts and to the occurrence of symptoms while working on the combine where the wheat chaff has been proven responsible for the symptoms In certain seed pea growing areas there is an apparent sensitivity of some workers to the specific pea hay or "pea dust"

In this dry, low humidity area, molds are of minor importance. Smuts and rusts are perhaps of more importance, but affecting only those patients who are exposed to an abundance of such spores

The pollen incidence is influenced by the temperature and the type of soils Since the south central areas are warmer, spring comes earlier than in the southern part of the State.

alfalfa and sweet clover make up a smaller portion of the agricultural crops.

In Central Washington around Wenatchee and Yakima, where water from irrigation is already available, extensive apple and pear orchards exist. In the Yakima area and along the Columbia River to Pasco, small fruits such as cherries, apricots and peaches are raised. Grapes are grown extensively around Pasco and Kennewick in South Central Washington The warmer climate in the south central portion of the State allows growing early truck garden crops such as asparagus, lettuce, onions, spinach, etc.

The northern part of the State is heavily wooded with pines, spruce and tamarack (Western Larch) in the higher altitudes, while in the valleys the usual deciduous trees are found. Lumbering is therefore a very important industry in this section of the State.

In the mountains are also found deposits of lead, zinc and silver. Some extensive mines are found in the northeastern part of the State. Here also, sandstone, marble, limestone, cement and clay are produced.

Climate. The climate of this area of Washington is seasonal. In the northern mountainous areas, the mean temperature is 48° with extremes of 108° to minus 30° reported. In the dry land areas, the mean temperature is 54° with extremes of 113° to 29° reported. In summer the average temperature is 70 to 74° while in winter the temperatures average 27 to 32°, the higher averages occurring in the dry land areas.

The relative humidity is about 40% in the summer and 82% in the winter with a mean of 61% The percentage of days of sunshine is 57% and heavy fog on a total of 17 days during October to March in the mountainous areas while 13 days during November to February in the dry land areas. The total average precipitation for this entire area is 16 inches per year.

Frosts come quite regularly in September in the mountainous areas and during October in the dry land areas.

Social Structure. Agriculture is by far the principle industry. It is very diversified, depending upon the area to be considered Wheat and grain crops predominate, yet cattle, sheep

Pollen	Prevalence	Time of Pollination
Short ragweed (*Ambrosia elatior*)	+	August-September
Small poverty weed (*Iva axillaris*)	++	July-August
Western ragweed (*Ambrosia psilostachya*)	+	August-September
White sagebrush (*Artemisia ludoviciana*)	++	July-September
Yellow dock (*Rumex crispus*)	++	June-July

Symbols Showing Relative Abundance of Hay Fever Plants

+++++ The most abundant
++++ Very abundant
+++ Abundant
+++ Common
++ Occurs in isolated patches
+ and without symbol, scarce.

The dates of pollination are approximate They vary with location and season

There frequently is as much as four to six weeks difference in the beginning of pollination of the trees and grasses in the Pasco-Walla Walla Areas and the Spokane Area, a distance of 160 miles

The grasses will complete pollination earlier and have a shorter season as a rule in the dry land areas of the State. Most of the common grasses have completed their pollination in these areas by June 15th while in the northern part of the State from June 1 to 15 marks the height of the grass season In the higher altitudes, timothy may not commence its pollination until July 1 There is some grass pollen in the air, however, as late as September.

Although not a heavy pollen producer, the most important weed in this area is Russian thistle Even though relatively few pollen grains are found on the pollen plates, it is apparently quite toxic and only a few pollen grains make a difference in symptom production

In the southern part of the State, the late pollinating weed season starts as early as June 1 to 15 while in the Spokane area one expects its effects about July 1 to 15 The valleys of the Columbia and its tributaries not only in the southern part of the State but extending into the extreme northern part of this State and southern British Columbia are abundantly covered with this weed.

Where Russian thistle occurs, so the various pigweeds and

TABLE II

HAY FEVER PLANTS IN EASTERN WASHINGTON

Pollen	*Prevalence*	*Time of Pollination*
Trees		
Alder *(Alnus tenuifolia)*	+	March-April
Aspen *(Populus tremuloides)*	++	April
Black cottonwood *(Populus trichocarpa)*	+	April
Box elder *(Acer negundo)*	++	April
Poplar *(Populus spp.)*	+	April
Spring birch *(Betula fontinalis)*	++	April-May
Willow *(Salix lasiandra-caudata)*	++	March-April
Yellow pine *(Pinus ponderosa)*	+++	Latter part June
Lodgepole pine *(Pinus contorta)*	++	Latter part May
Grasses		
Annual June *(Poa annua)*	+++	April-October
Blue bunch *(Agropyron spicatum)*	++++	May-June
Canada blue *(Poa compressa)*	+++	May-June
Giant rye *(Elymus condensatus)*	+++	June
Kentucky blue *(Poa pratensis)*	+++++	May-September
Koeler's *(Koeleria cristata)*	+++	June
Orchard *(Dactylis glomerata)*	+	June-July
Quack *(Agropyron repens)*	++	June-September
Red top *(Agrostis alba)*	+	June
Sandberg's June *(Poa sandbergii)*	+++	May-June
Smooth brome *(Bromus inermis)*	+++	May-June
Timothy *(Phleum pratense)*	+++	June-July
Weeds		
Atriplex *(Atriplex spp.)*	+++	July-September
Balsam root *(Balsamorrhiza)*	+	May
Common sagebrush *(Artemisia tridentata)*	++++	August-October
Dandelion *(Taraxacum taraxacum)*	++++	May-September
English plantain *(Plantago lanceolata)*	+	June-September
False western ragweed *(Franseria acanthicarpa)*	++++	August-September
Giant poverty weed, or burweed *(Iva xanthifolia)*	++++	August-September
Greasewood *(Sarcobatus vermiculatus)*	+	May-September
Green sagebrush *(Artemisia dracunculoides)*	+	July-September
Lamb's quarters *(Chenopodium album)*	+++	July-September
Mugwort *(Artemisia vulgaris)*	++	July-September
Nettle *(Urtica lyallii)*	+	July-August
Prostrate pigweed *(Amaranthus blitoides)*	++	June-September
Redroot pigweed *(Amaranthus retroflexus)*	++++	June-September
Russian thistle *(Salsola pestifer)*	+++++	June-September
Sheep sorrel *(Rumex acetosella)*	+++	May-September

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Where Russian thistle occurs, so the various pigweeds and

sages occur. The common sagebrush *(Artemisia tridentata)* occurs however, most abundantly in the dry land areas. Mugwort *(Artemisia vulgaris)*, white sage *(Artemisia ludoviciana)* and green sage *(Artemisia dracunculoides)* occur more abundantly in the northern section of the State.

Other members of the composite family as the false ragweed occur sporatically and are not too abundant. In certain sections, poverty weed and burweed are very abundant and they are as important as Russian thistle. Its pollen is also very toxic.

For many years, we have been able to say that this section is free of short ragweed. In recent years, this weed was introduced as a cover crop in the apple orchards near Wenatchee. It has spread north along the Okanogan River and south along the Columbia River so that it now must be considered as a pollen factor in this Central Washington Area. The regions around Spokane and Walla Walla are still free of this weed.

MONTANA

Geography. In land area, this State is topped only by that of Texas and California. It is almost 550 miles from the extreme eastern to the extreme western border. It is bounded on the north by the eastern portion of Canada's British Columbia, all of Alberta and most of Saskatchewan, on the west by Idaho, on the south by a portion of Idaho and Wyoming and on the east by North and South Dakota.

The State is divided into two unequal sized sections by the Rocky Mountains The eastern or plains section occupies about three-fifths of the total area of the State. It consists of level, undulating tableland broken occasionally by stream valleys and by branches of the Rockies or isolated groups of mountains. From its Eastern Dakota boundary, the land rises in elevation from 2800 feet to 4,000-5,000 feet in the foothills of the Rockies.

The western part is rugged, cut by mountain ranges and valleys. These mountains and foothills are heavily timbered. The average elevation of the crest of the Continental Divide is about 6,500 feet and the peaks rise to heights of 8,000 to 12,-

850 feet in elevation. The western boundary at the Idaho border is formed by the Bitterroot Mountains, whose elevation rises to 7,000 to 8,000 feet.

In the State are almost 25,000,000 acres of forest land, much of which is in unspoiled primitive condition. The two most valuable commercial species of timber are western white pine and the western yellow or ponderosa pine. Other major species are Englemann spruce, western red cedar, tamarack or western larch, Douglas fir, lodgepole pine, white fir and hemlock. In these forests and mountain retreats are bear, elk, moose, mountain sheep and goats, among the larger game animals.

Fishing is excellent in most of the mountain lakes and streams. With such unlimited grandeur, one of the main industries of the State is dude ranching, concentrated in the mountain areas and about the scores of hot springs.

Located in the northwestern portion of the State is Glacier National Park, in which are nearly a million acres of the finest mountain scenery in America. Among the higher peaks are more than 60 glaciers and 200 lakes nestled in among mountains that rise 3,000 to 5,000 feet above these lakes. Animal life is varied and abundant. Floral life is one of the outstanding features as 1,000 species of flowering plants have been identified. Weeds are a rarity in the park proper. The park should be recognized as a hay fever refuge for the weed sensitive individual.

Climate. The climate of the state is seasonal. The mean temperature reported at weather stations in Eastern Montana (Glasgow) give a mean temperature of 42.4° with a high of 108° and a minimum of minus 50°. Average summer temperature is 72° while winter temperatures average 12°. In Central Montana (Great Falls) and Western Montana (Missoula) the mean temperature is 45° with a high reported at 105° and a low between minus 28° at Missoula and minus 35° at Great Falls. The average relative humidity is 67% at Missoula and 59 and 60% at Great Falls and Glasgow. In the western portion of the State, sunshine occurs 50% of the days while in the

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Havre, Dawson County Junior College at Glendive; and Custer County Junior College at Miles City.

There are no allergenic factors special to this region except those that agriculture, mining, oil and gas industries may bring to that area. As example, natural gas is used quite extensively in the north central areas and a certain percentage of patients have had their allergic manifestation aggravated from this source just as the smelter fumes (SO_2) aggravate and/or produce nasal and asthmatic symptoms when the wind blows these fumes into the homes of the patients so affected.

The extremely cold winters in Eastern Montana may aggravate the allergic with a low cold tolerance but the humidity on such extremely cold days is also usually low. Such patients are not aware of these low temperatures as are patients where there is a zero temperature and a comparatively high humidity

Mold and Pollen Survey. Air-borne molds are of minor importance in this State Where grains are grown, the smuts and rusts are perhaps of more importance but affecting only those individuals who are exposed to an abundance of such spores

There is much similarity in the incidence of air-borne pollens in Western and Central Montana to that found in Idaho, Eastern Oregon and Eastern Washington In the broad, dry valleys, the weeds grow quite abundantly while in the higher altitudes they occur but rarely and the grasses are the predominent hay fever producing allergens. In the valleys on the eastern slopes of the Rockies, the short ragweed is found occasionally but becomes an increasingly important pollen offender as the eastern boundary of the state is reached In the Bitterroot Valley and in the areas in central and eastern Montana where sugar beets are raised abundantly, the pollen of those beets that have been allowed to bloom must be seriously considered

During the late spring, the hillsides of western and central Montana are golden yellow due to the blooms of dandelion and balsam root Even though the plant is considered insect pollinated, the pollen is brought into the air by high winds

eastern part of the State there are 60% of the days with sunshine. In all parts of the State there is an average of 14 inches of rain per year.

Fog occurs about 14 days per year, most frequent from October to March. Frosts come quite regularly in the mountainous areas and valleys in September. In the plains of the eastern section of the State frost occurs during October.

Social Structure. Agriculture and mining are Montana's leading industries. Gold attracted the first immigrants to Gold Creek, Bannack and Virginia City and much of Montana's early exciting history and romance is written around these discoveries. The "Glittering Hill" of Butte produces nearly one-third of the copper mined in the United States and one-sixth of that mined in the world At nearby Anaconda is located one of the largest smelters in the world, that treats the copper, gold, silver, lead, manganese and zinc ores mined in Butte. In other portions of the State at Great Falls and East Helena, sulphuric acid, phosphate fertilizers, lead and also zinc are produced.

In agriculture, wheat is Montana's major crop Corn, alfalfa hay, oats, barley, flax, rye and sugar beets make up the majority of the other agricultural products. Montana is the third sheep raising State in the Union. Beef cattle, hogs and dairy cows also rank high in the agriculture of the State.

Oil and natural gas wells were first discovered in the area north of Shelby and now centered around Cut Bank, in the foothills of the Rockies. This industry outshadows mining At Cut Bank are over 600 oil wells and 100 gas wells in an area of about 200 square miles. New wells are constantly being brought in.

The largest city in the State is the mining City of Butte Others are Great Falls, Billings, Helena and Missoula.

Higher educational facilities are found at the Montana State University at Missoula, Montana State College at Bozeman, Montana School of Mines at Butte, Carroll College (Roman Catholic) at Helena, East Montana State Normal School at Billings, Great Falls College of Education, Montana State Normal College at Dillon, Northern Montana College at

Pollen	Prevalence Western	Eastern	Time of Pollination
Giant ragweed (*Ambrosia trifida*)	–	++	August-September
Greasewood (*Sarcobatus vermiculatus*)	+	+++	May-September
Green sagebrush (*Artemisia dracunculoides*)	++	+	August-September
Lamb's quarters (*Chenopodium album*)	++++	++++	July-September
Mexican fireweed (*Kochia scoparia*)	+	+	July-September
Mugwort (*Artemisia vulgaris*)	+	+	August-September
Rough redroot pigweed (*Amaranthus retroflexus*)	++	++++	July-August
Russian thistle (*Salsola pestifer*)	++++	+++++	July-September
Sheep sorrel (*Rumex acetosella*)	+++	++	May-October
Short ragweed (*Ambrosia elatior*)	–	++	August-September
Small poverty weed (*Iva axillaris*)	+	+++	July-August
Sugar beet (*Beta vulgaris*)	+	+	July-September
Western ragweed (*Ambrosia psilostachya*)	+	+	August-September
White sagebrush (*Artemisia ludoviciana*)	+	++	August-September

Symbols Showing Relative Abundance of Hay Fever Plants

+++++ The most abundant
++++ Very abundant
+++ Abundant
++ Common
+ Occurs in isolated patches
and without symbol, scarce.

The dates of pollination are approximate They vary with location and season.

and is carried considerable distances Pollen from such flowers is considered definitely allergenic and must be included in the desensitizing treatments of patients who show a sensitiveness to these pollens

Since the topography and soil make-up of the State varies, any pollen survey must be of necessity a general one The locality to be considered should be specifically known in order that one can advise the specific pollen make-up of that area.

IDAHO

Geography. The State of Idaho contains about 84,000 square miles. It is bounded on the north by British Columbia,

TABLE III
HAY FEVER PLANTS IN MONTANA

Pollen	Prevalence Western	Prevalence Eastern	Time of Pollination
Trees			
Alder (*Alnus tenuifolia*)	++	+	March-April
Aspen (*Populus tremuloides*)	++	+	May
Black cottonwood (*Populus trichocarpa*)	++	+	April-May
Box elder (*Acer negundo*)	+	+	April
Carolina poplar (*Populus deltoides*)	+	+	April-May
Lodgepole pine (*Pinus contorta*)	+++	+	June
Spring birch (*Betula fontinalis*)	++	+	April-May
Willow (*Salix lasiondra-candata*)	+++	+	March-April
Yellow pine (*Pinus ponderosa*)	+++	++	June
Grasses			
Annual June (*Poa annua*)	+	++	May-June
Blue bunch (*Agropyron spp.*)	+	++	May-June
Canada blue (*Poa compressa*)	+++	++	May-June
Giant rye (*Elymus condensatus*)	++	++	May-June
Kentucky blue (*Poa pratensis*)	++++++	++++	May-June
Koelers (*Koeleria cristata*)	+	+	May-June
Meadow fescue (*Festuca elatior*)	+	+	May-June
Orchard (*Dactylis glomerata*)	++	+++	June-July
Quack (*Agropyron repens*)	+	++	June-September
Red top (*Agrostis alba*)	+++++	++	June
Smooth brome (*Bromus inermis*)	+++	++++	May-June
Timothy (*Phleum pratense*)	+++	+++	June
Weeds			
Atriplex (*Atriplex hastata*)	++	+++	June
Balsam root (*Balsamorrhiza*)	+++	+	May-June
Common sagebrush (*Artemisia tridentata*)	+	+++	September-October
Dandelion (*Taraxacum taraxacum*)	++++	++++	May-September
English plantain (*Plantago lanceolata*)	+	++	June-September
Giant poverty weed or burweed (*Iva xanthifolia*)	++	+++	August-September

and dairying are major industries. In cheese production, this State ranks fourth in the nation. It ranks seventh in the amount of wool shipped annually. The State is rich in mineral resources Lead, zinc, silver, phosphate rock and gold are the chief mineral products. The state ranks first in the production of silver and zinc and second in lead. At Kellogg, the Bunker Hill-Sullivan Mine is the largest lead producing mine in the world and nearby is the Sunshine Mine that produces the largest amount of silver in the country.

Since forests cover two-fifths of the state, lumbering gives employment to 65% of the industrial population Western white pine, yellow pine, red cedar, Douglas fir, white fir and Engleman spruce comprise the bulk of the coniferous species from which lumber is produced The State ranks twelfth in lumber production in the United States

Educational facilities include the University of Idaho at Moscow, University of Idaho, Southern Branch, at Pocatello, Ricks College (Latter Day Saints) at Rexburg, College of Idaho (Presbyterian) at Caldwell, Northwest Nazarene College at Nampa, North Idaho Junior College at Coeur d'Alene and Boise Junior College at Boise

The largest cities are Boise (the Capital), Pocatello, in the southern part of the State, Lewiston and Coeur d'Alene in the northern part of the State

Where seed peas are grown extensively, there is an apparent specific sensitivity to pea hay and "pea dust"

Since hard rock mining is one of the major industries of Northern Idaho, one must consider a diagnosis of silicosis in the asthmatics we see from this area Everyone that wheezes is not necessarily asthmatic, particularly in those who have been or are miners.

Pollen and Mold Survey. The pollen make up of Idaho is quite varied and depends upon the geographic make up of the area in question In the mountainous areas, particularly in the northern part of the State, the late pollinating weeds are minor in their local occurrences However, the low valleys and the prevalent high winds from the dry land areas of

on the west by Oregon and Washington, on the east by Montana and Wyoming and on the south by Nevada and Utah. The State is narrowest at the Canadian border where it is about 40 miles in width. It gradually widens to about 300 miles at its southern border. The entire State is about 475 miles long.

The northern and the greater part of the eastern portion of the State is mountainous. These rise from about 2,000 feet to the highest in the State, Mount Borah, which is 12,655 feet above sea level. The mountains gradually decrease in elevation westward to the Snake River Plains. These were built up principally of lava and are the largest lava plains in the United States except those of the Columbia River.

Many lakes are scattered throughout the State, the largest are found in Northern and Central Idaho. The mountain encircled waters of Pend Oreille, Coeur d'Alene, Priest and Payette Lakes are probably the most scenic in the United States, adding much to the recreational facilities of the State Much of the forested areas is being kept in its primitive State. Nineteen national forests are found in the state, 11 of these are wholly within the state.

Climate. The normal mean temperature for southern Idaho is about 50° while in the mountainous areas it is about 47°. The highest temperature reported for the State was at Boise, 109°. The lowest temperature was minus 31° at Pocatello. The average summer temperature is about 73° while the average winter temperature is about 24°. In the lowlands, there were about eight foggy days per year, while in the mountains, 17 days of fog are reported. Sunshine occurs about 63% of the days. About 12 inches of precipitation occurs per year.

Social Structure. The most highly developed agricultural region of Idaho is found in the Snake River Plains and its tributary valleys where soil is composed chiefly of disintegrated lava and is very fertile when irrigated. The water supply is ample and there are many large irrigation projects. The most important crops are wheat, hay, oats, barley, potatoes, beans, peas, sugar beets and fruits. Sheep and cattle raising

and dairying are major industries. In cheese production, this State ranks fourth in the nation. It ranks seventh in the amount of wool shipped annually. The State is rich in mineral resources. Lead, zinc, silver, phosphate rock and gold are the chief mineral products The state ranks first in the production of silver and zinc and second in lead At Kellogg, the Bunker Hill-Sullivan Mine is the largest lead producing mine in the world and nearby is the Sunshine Mine that produces the largest amount of silver in the country.

Since forests cover two-fifths of the state, lumbering gives employment to 65% of the industrial population. Western white pine, yellow pine, red cedar, Douglas fir, white fir and Engleman spruce comprise the bulk of the coniferous species from which lumber is produced. The State ranks twelfth in lumber production in the United States.

Educational facilities include the University of Idaho at Moscow, University of Idaho, Southern Branch, at Pocatello, Ricks College (Latter Day Saints) at Rexburg, College of Idaho (Presbyterian) at Caldwell, Northwest Nazarene College at Nampa, North Idaho Junior College at Coeur d'Alene and Boise Junior College at Boise.

The largest cities are Boise (the Capital), Pocatello, in the southern part of the State, Lewiston and Coeur d'Alene in the northern part of the State

Where seed peas are grown extensively, there is an apparent specific sensitivity to pea hay and "pea dust"

Since hard rock mining is one of the major industries of Northern Idaho, one must consider a diagnosis of silicosis in the asthmatics we see from this area. Everyone that wheezes is not necessarily asthmatic, particularly in those who have been or are miners

Pollen and Mold Survey. The pollen make up of Idaho is quite varied and depends upon the geographic make up of the area in question In the mountainous areas, particularly in the northern part of the State, the late pollinating weeds are minor in their local occurrences However, the low valleys and the prevalent high winds from the dry land areas of

TABLE IV
HAY FEVER PLANTS IN IDAHO

Pollen	Prevalence Northern	Prevalence Southern	Time of Pollination
Trees			
Alder (*Alnus tenuifolia*)	++	+	March-April
Aspen (*Populus tremuloides*)	++	+	April
Black cottonwood (*Populus trichocarpa*)	++	+	April-May
Box elder (*Acer negundo*)	+	+	April
Spring birch (*Betula fontinalis*)	++	+	May
Willow (*Salix spp.*)	++	+	March-April
Yellow pine (*Pinus ponderosa*)	+++	+	June
Grasses			
Annual June (*Poa annua*)	+	+	April-September
Canada blue (*Poa compressa*)	+++	++	May-July
Giant rye (*Elymus condensatus*)	++	++	June-July
Kentucky blue (*Poa pratensis*)	+++++	+++	May-September
Koelers (*Koeleria cristata*)	+	+	June
Orchard (*Dactylis glomerata*)	++	+++	June-July
Quack (*Agropyron repens*)	+	++	June-September
Red top (*Agrostis alba*)	++++	++	June
Salt grass (*Distichlis spicata*)	–	+++	May-July
Smooth brome (*Bromus inermis*)	+++	+++	May-June
Meadow fescue (*Festuca elatior*)	–	+++	June-August
Timothy (*Phleum pratense*)	+++	+++	June
Western wheat (*Agropyron smithii*)	+	++	June-August
Weeds			
Atriplex (*Atriplex hastata*)	++	+	August-September
Common sagebrush (*Artemisia ludoviciana*)	+	+++	August-October
Dandelion (*Taraxacum taraxacum*)	+++	++++	May-September
English plantain (*Plantago lanceolata*)	+	+	June-September
False western ragweed (*Franseria acanthicarpa*)	+	+	August-September
Giant poverty weed or burweed (*Iva xanthifolia*)	++	+++	August-September
Greasewood (*Sarcobatus vermiculatus*)	–	+	May-September

Pollen	Prevalence Northern	Prevalence Southern	Time of Pollination
Green sagebrush (*Artemisia dracunculoides*)	++	+	July-August
Mexican fireweed (*Kochia scoparia*)	+	+	July-September
Mugwort (*Artemisia vulgaris*)	+	+	July-September
Prostrate pigweed (*Amaranthus blitoides*)	+	+	July-September
Rough redroot pigweed (*Amaranthus retroflexus*)	+++	+++	July-September
Russian thistle (*Salsola pestifer*)	++++	++++	June-September
Shad scale (*Atriplex canescens*)	+	+++	August-September
Sheep sorrel (*Rumex acetocella*)	+++	++	May-October
Small poverty weed (*Iva axillaris*)	+	++	July
Sugar beet (*Beta vulgaris*)	–	+	July-August
Western ragweed (*Ambrosia psilostachya*)	+	++	August-September
White sagebrush (*Artemisia ludoviciana*)	+	++	July-August

Symbols Showing Relative Abundance of Hay Fever Plants
++++ The most abundant ++ Common
+++ Very abundant + Occurs in isolated patches
++ Abundant – and without symbol, scarce
The dates of pollination are approximate They vary with location and season

Eastern Washington bring these pollens into the higher areas Patients showing a sensitiveness to these weeds must be protected, even though the weeds are rarely present in those areas

In the northern section of the State, the grasses pollinate quite late in the spring, while in the southern section they occur quite early in the spring In the irrigated areas, these continue much longer than in the dry land areas but some grass pollen is found throughout the entire pollination season Short ragweed becomes a major problem in the area around Pocatello The central and northern portion of the State is free of this weed The false ragweeds (*Franseria*) occur in

moderate abundance in the Lewiston area of north Idaho but also occur in Southern Idaho.

Giant poverty weed or burweed *(Iva xanthifolia)* is abundant in the Snake River Valley and this has been reported on several occasions as giant ragweed *(Ambrosia trifida)* but ragweed has not been observed by the author in that area.

NEVADA

Geography. The State is bounded on the west by California, on the north by Eastern Oregon and Western Idaho, on the east by Utah and a portion of Arizona, on the south by California and a portion of Arizona

Topographically, Nevada can best be described as a series of parallel valleys divided by high mountain ranges running the length of the State from north to south. It is a part of the Great Basin lying between the Rocky and Sierre Nevada Mountains. These mountains attain altitudes of 7,000 to 10,000 feet. Boundary Peak in the White Mountains is the highest in the State. It rises to 13,145 feet. The Colorado River Valley is the lowest in the State and in the vicinity of Hoover Dam, the altitude is but 470 feet. Most of the State has a higher altitude since the average altitude of the State is 5,500 feet.

The majority of the rivers of Nevada flow only during the wet season in winter and spring Their waters are lost either in the alluvium deposits of the valleys or evaporate from the level floors of the lakes. During the dry season, these become hardened mudflats and frequently covered with a white deposit of salt. In the northern portion of the State, the rivers are more permanent from the slowly melting snow in the high mountains

Climate. The climate of Nevada is seasonal except in the extreme southern portion where the climate is semitropical The mean annual temperature for the State is 49° The summer average for the state is 66° while the winter average is 26°. The extremes are 96° to minus 27°. The relative humidity averages 53%. In the summer, the average is 38% with afternoon readings as low as 5% while in the winter the average is 66%.

TABLE V

HAY FEVER PLANTS IN NEVADA
*Reno-Carson City Area**

Plant	Prevalence	Time of Pollination
Trees		
Soft maple, silver-leaf maple (*Acer Saccharinum*)	+++++	March-April
Cork elm (*Ulmus Carpinifolia*)	+++++	March-April
Siberian or Chinese elm (*Ulmus pumila*)	+++++	March
Black locust (*Robinia pseudoacacia*)	++++	May
Cottonwood (*Populus deltoides*)	+++++	April
Narrow-leaf willow (*Salix exigua*)	+++++	April-May
Jeffrey pine (*Pinus Jeffreyi*)	++++	
Single-leaf pinyon (*Pinus cembrodies*)	++++	
Yellow pine (*Pinus ponderosa*)	+++	
Utah juniper (*Juniperus utahensis*)	++++	March-May
Arbovitae (*Thuja occidentalis*)	+++	March
Incense cedar (*Libocedrus decurrens*)	+++	March
Mountain alder (*Alnus tenuifolia*)	+++	April
Arryo willow (*Salix laseolepis*)	+++	March-April
Yellow willow (*Salix Lasiandra*)	+++	May
Cottonwood (*Populus Fremontii*)	+++	March
Lombardy poplar (*Populus nigra*)	+++	March
White ash (*Fraxinus americana*)	+++	March-May
Green ash (*Fraxinus pennsylvanica*)	+++	March-May
Box elder (*Acer negundo*)	+++	April-May
London plane tree, maple-leaf sycamore (*Platanus acerifolia*)	+++	April
Catalpa (*Catalpa speciosa*)	+++	May
Eastern black walnut (*Juglans nigra*)	++	May
English walnut (*Juglans regia*)	+	April-May
American elm (*Ulmus Americana*)	+++	March-April
Gray birch (*Betula populifolia*)	++	April
European white birch (*Betula pendula*)		
American linden (*Tilia Americana*)	++	April
Grasses (Gramineae)	+++	May
Downy brome (*Bromus tectorum*)	++++++	May-June
Timothy (*Phleum pratense*)	+++++	June-August
Kentucky bluegrass (*Poa pratensis*)	+++++	May-July
Quack grass (*Agropyron repens*)	++++	June-July
Red top (*Agrostis alba*)	++++	June-August
Foxtail barley, squirrel tail (*Hordeum jubatum*)		
Alkali rye grass (*Elymus triticoides*)	+++++	June-August
Salt grass, alkali grass (*Distichlis stricata*)	+++++	May-June
Orchard grass (*Dactylis glomerata*)	++++	May-July
Cultivated oat (*Avena sativa*)	++++	May-June
Cultivated barley (*Hordeum vulgare*)	++++	April-June
	++++	March-May

TABLE V *(Continued)*

Plant	*Prevalence*	*Time of Pollination*
Giant rye grass *(Elymus condensatus)*	+++	June-July
Red brome *(Bromus rubrum)*	+++	April-May
Brome grass *(Bromus marginatus)*	+++	June-July
Nevada bluegrass *(Poa nevadensis)* *(Poa longiligula)*	+++	May-June
Velvet grass *(Holcus lanatus)*	++++	April-June
Perennial rye grass *(Lolium perenna)*	+++	June-July
Bluestem, western wheatgrass *(Agropyron Smithii)*	+++	June-July
Barnyard grass *(Echinochloa crusgalli)*	+++	June-August
Cultivated rye *(Secale cereale)*	++	May-June
Wheat *(Triticum aestivum)*	+++	May-June
Broncho grass, ripgut *(Bromus rigidus)*	++	April-May
Western rye grass *(Elymus glaucus)*	+	June
Meadow barley *(Hordeum nodosum)*	++	June
Weeds and Shrubs		
Chenopodiaceae		
Bassia *(Bassia hysopifolia)*	++++	July-September
Russian thistle *(Salsola pestifer)*	++++	July-September
Lamb's quarters *(Chenopodium alba)*	++++	May-August
Redscale, red orach *(Atriplex rosea)*	++++	July-September
Hop sage *(Grayia spinosa)*		April-May
Greasewood *(Sarcobatus vermiculatus)*	++++	May-June
Burning bush, summer cypress *(Kochia scoparia)*	+++	July-September
Sheep-fat, shadscale, spring saltbush *(Atriplex confertifolia)*	++	May-June
Wingscale "shadscale" *(Atriplex canescans)*	++ +++	May-August
Bractscale *(Atriplex serenana)*	+++	June-August
Lenscale *(Atriplex lentiformis)*	++	July-August
Spearscale *(Atriplex patula)*	++	June-July
Wedgescale *(Atriplex fruncata)*	++	June-July
Winter-fat *(Eurotia lanata)*	++	April-May
Polygonaceae		
Curly dock, yellow dock *(Rumex crispus)*	++++	May-July
Sheep sorrel, sorrel dock *(Rumex acetosella)*	++	
Amaranthaceae		
Redroot pigweed, pigweed, rough pigweed *(Amaranthus retroflexus)*	+++++	July-September
Tumbling pigweed, tumbleweed *(Amaranthus graecizans)*	++++	July-September
Cruciferae		
Tumble-mustard *(Sisymbrium altissimum)*	++++	April-May

Plant	Prevalence	Time of Pollination
Tansy-mustard *(Descurainia Sophia)*	++++	April-May
Compositae		
Common sagebrush *(Artemesia tridentata)*	+++++	August-October
False ragweed, Bur Ragweed *(Franseria acanthacarpa)*	++++	August-September
Rabbit brush *(Chrysothamnus nauseosus)*	++++	June-October
Sunflower *(Helianthus annus)*	+++	July-September
Cocklebur *(Xanthium pennsylvanicum)*	+++	July-September
Dandelion *(Taraxacum officinale)*	+++	April-August
Poverty weed *(Iva axillaris)*	+++	June-July
Prairie sage, western mugwort, cud-weed *(Artemesia vulgaris, Var. gnaphalodes)*	+++	August-September
Dark-leaf mugwort, prairie sage *(Artemesia ludoviciana)*	++	August-September
Spiny sagebrush *(Artemesia spinescens)*	++	April-May
Spiny cocklebur or clotbur *(Xanthium spinosum)*	++	June-September
Goldenrod *(Solidago sp.)*	++	August-October
California mugwort *(Artemesia heterophylla)*	++	August-September
Black sagebrush *(Artemesia arbuscula)*	++	August-September
(Artemesia cana)	++	August-September
(Artemesia nova)	++	August-September
Urticaceae		
Nettle *(Urtica gracilis)*	+++	July-August
Plantaginaceae		
English, narrow-leaf plantain *(Plantago lanceolata)*	+++	June-August
Common plantain *(Plantago major)*	+++	April-May

* Pollen surveys by Robert Townsend, Botanist, Hollister-Stier Laboratories

The annual precipitation for the State is 9.02 inches while in the Las Vegas area the average is only 4.27 inches. There are 69% of the days when sunshine occurs. During the time that records have been kept in Nevada, no heavy fog has been reported.

Social Structure. Agriculture is the principal industry. The Las Vegas Valley soil, rich and under irrigation, produces good crops of alfalfa and grass hay, wheat, potatoes, sugar beets,

TABLE VI
HAY FEVER PLANTS IN NEVADA
*Las Vegas Area**

Plant	Prevalence	Time of Pollination
Trees		
Siberian or Chinese elm (*Ulmus pumila*)	++++	February-March
California cottonwood (*Populus Fremontii*)	+++++	February-April
Tamarisk (*Tamarix aphylla*)	+++++	May-September
Honey locust (*Robina pseudoacacia*)	++++	April-May
Screwbean mesquite (*Prosopis pubescens*)	++++	April-July
Common mesquite (*Prosopis chilensis*)	++++	April-July
Arizona ash (*Fraxinus Toumeyi*)	+++	February-April
American sycamore (*Platanus occidentalis*)	+++	April-May
Lombardy poplar (*Populus nigra*)	+++	February-March
(a) Quaking aspen (*Populus tremuloides*)	+++	April-May
Olive (*Olea europaea*)	++	May-June
Arborvitae (*Thuja orientalis*)	++	February-March
Willow (*Salix exigua*) (*Lasiolepis laevigata*)	+++	February-May
(a) California juniper (*Juniperus californica*)	+++	Oct.-Nov. Feb - March
(a) Gambel's oak (*Quercus Gambelli*)	+++	May
Grasses (Gramineae)		
Johnson grass (*Sorghum halepense*)	+++	June-September
Perennial and English rye grass (*Lolium perenne*)	+++	April-July
Reed (*Phragmites communis*)	++	August-October
Foxtail (*Setaria leutescens*)	+++	July-September
Sporobolis asperifolius	++	June-September
Timothy (*Phleum pratense*)	++	May-July
Bermuda grass (*Cynodon dactylon*)	+++++	March-October
Salt grass (*Distichlis stricata*)	++++	May-October
Dropseed (*Sporobolus airoides*)	++++	May-August
Weeds and Shrubs		
Chenopodiaceae		
Shadscale, sheep-fat, spiny saltbush (*Atriplex confertifolia*)	+++++	April-May
Allscale (*Atriplex polycarpa*)	++++	August-September
Bassia (*Bassia hysopifolia*)	++++	July-September
Russian thistle (*Salsola Kali*)	+++	May-August
(a) Wingscale, shadscale (*Atriplex canescens*)	+++	June-September
Nevada saltbush (*Atriplex torreyi*)	++	August-September
Burningbush, summer cypress (*Kochia scoparia*)	++	

Plant	Prevalence	Time of Pollination
Silverscale, fogweed (*Atriplex expansa*)	++	June-August
Lamb's quarters (*Chenopodium album*)	++	April-July
Hop-sage (*Grayia spinosa*)	+	March-April
Winter-fat (*Eurotia lanata*)	++	April-May
Greasewood (*Sarcobatus vermiculatus*)	+	April-August
Seablite, alkaleblite, seepweed (*Suaeda fruticosa*)	++++	July-September
Compositae		
Burroweed (*Franseria dumosa*)	+++++	February-April
Rabbitbrush (*Chrysothamnus nauseosus*)	++++	October-November
(a) Common sagebrush (*Artemesia tridentata*)	+++	September-November
Cocklebur (*Xanthium pennsylvanicum*)	+++	June-September
Sunflower (*Helianthus annuus*)	+++	April-October
Western ragweed (*Ambrosia psilostachya*)	++	July-September
False ragweed, bur ragweed (*Franseria acanthicarpa*)	++	August-October
Amaranthaceae		
Red-rooted pigweed, rough pigweed (*Amaranthus retroflexus*)	++	July-October
Zygophyllaceae (Caltrops Family)		
Creosote bush (*Larrea divaricata*)	++++	February-May
Gnetaceae		
Ephedra, mormon tea, desert tea (*Ephedra sp.*)	+++	February-April
Leguminoseae		
Alfalfa (*Medicago sativa*)	+++	April-October

(a) These plants found only at higher elevations in the hills and mountains surrounding Las Vegas

* Pollen surveys by Robert Townsend, Botanist, Hollister-Stier Laboratories

orchard and small fruits and vegetables. In the southern semi-tropical area of the State, almonds, figs, grapes and pomegranates are grown. Dairying is increasing in importance and beef cattle and sheep add to the revenue of agriculture.

Nevada is essentially a mining State. Most important mineral mined is copper, but gold, silver, lead, zinc, manganese, tungsten, platinum and uranium are also mined. In some of the lake beds, deposits of antimony, iron, salt and nitrate are found.

TABLE VI
HAY FEVER PLANTS IN NEVADA
*Las Vegas Area**

Plant	Prevalence	Time of Pollination
Trees		
Siberian or Chinese elm *(Ulmus pumila)*	++++	February-March
California cottonwood *(Populus Fremontii)*	+++++	February-April
Tamarisk *(Tamarix aphylla)*	+++++	May-September
Honey locust *(Robina pseudoacacia)*	++++	April-May
Screwbean mesquite *(Prosopis pubescens)*	++++	April-July
Common mesquite *(Prosopis chilensis)*	++++	April-July
Arizona ash *(Fraxinus Toumeyi)*	+++	February-April
American sycamore *(Platanus occidentalis)*	+++	April-May
Lombardy poplar *(Populus nigra)*	+++	February-March
(a) Quaking aspen *(Populus tremuloides)*	+++	April-May
Olive *(Olea europaea)*	++	May-June
Arborvitae *(Thuja orientalis)*	++	February-March
Willow *(Salix exigua)* *(Lasiolepis laevigata)*	+++	February-May
(a) California juniper *(Juniperus californica)*	+++	Oct.-Nov. Feb.-March
(a) Gambel's oak *(Quercus Gambelli)*	+++	May
Grasses (Gramineae)		
Johnson grass *(Sorghum halepense)*	+++	June-September
Perennial and English rye grass *(Lolium perenne)*	+++	April-July
Reed *(Phragmites communis)*	++	August-October
Foxtail *(Setaria leutescens)*	+++	July-September
Sporobolis asperifolius	++	June-September
Timothy *(Phleum pratense)*	++	May-July
Bermuda grass *(Cynodon dactylon)*	++++++	March-October
Salt grass *(Distichlis stricata)*	+++++	May-October
Dropseed *(Sporobolus airoides)*	++++	May-August
Weeds and Shrubs		
Chenopodiaceae		
Shadscale, sheep-fat, spiny saltbush *(Atriplex confertifolia)*	++++++	April-May
Allscale *(Atriplex polycarpa)*	++++	August-September
Bassia *(Bassia hysopifolia)*	++++	July-September
Russian thistle *(Salsola Kali)*	+++	May-August
(a) Wingscale, shadscale *(Atriplex canescens)*	+++	June-September
Nevada saltbush *(Atriplex torreyi)*	++	August-September
Burningbush, summer cypress *(Kochia scoparia)*	++	

Las Vegas, located near the southern point of Nevada, lies in a neck of the Mojave Desert that extends north from Arizona and California This desert area, being hotter and drier and lower in altitude than the Great Basin area, differs considerably in its botanical make-up.

Creosote bush *(Larrea divaricata)* and Joshua tree *(Yucca brevifolia)* are two plants indicative of the Mojave Desert. The perennial atriplex group—sheep-fat *(A. confertifolia)*, allscale *(A. polycarpao)*, wingscale *(A canescens)*, etc. are much more dominant. Burroweed *(Franseria dumosa)* important in southern desert regions is absent in the northern desert. Sagebrush, on the other hand, which is extensively dominant in the Great Basin is practically absent in the Mojave Desert except for the mountainous regions.

West of the Reno Area, hayfever producing species are lacking that are very important factors north, east and southeast of this City. These mainly are members of the chenopodiaceae as hop-sage *(Grayia spinosa)*, greasewood *(Sarcobatus vermiculatus)*, wingscale *(Atriplex canescens)*, shadscale or sheep-fat *(Atriplex confertifolia)* There are also some members of the sagebrush group that are found at higher elevations east and north of Reno The single-leaf pinyon *(Pinus cembroides)* and the Utah juniper *(Juniperus utahensis)* are also found only north and east of Reno These two small trees cover great areas of the Nevada Mountains and bench lands where the altitude ranges from 4500 to 7000 feet above sea level.

Since the prevailing winds are from the west and an abundant hay fever producing flora occurs east of Reno, the communities east of this city such as Fernly and Fallon would have a greater and more varied pollen count than Reno itself.

The State is probably best known nationally for its 30 day residence to obtain a divorce. Many vacation centers have been established in and around Lake Tahoe, Las Vegas and Reno to accommodate these "residents."

The University of Nevada is at Reno and is the State's only Institution of higher learning.

Allergenic Factors Special to This Region. There are no allergenic factors that could be considered special to this area but one must call attention to the fact that wind and dust storms are quite common in the Las Vegas Area. In this dry desert-like area the soil is quite alkaline and therefore, quite irritating to the mucus membranes of the nose and throat. Those patients already having hay fever and asthmatic symptoms will be aggravated not only by the increased pollen concentration but also by the mechanical irritation of the dust and dirt. It must also be pointed out that such high winds in a region of such dryness undoubtedly picks up much pollen that has lodged on distant desert herbage and in the dust and sand of that area. Where there is that lack of moisture, such pollens will be well preserved and potent because of the drying effect of the climate. Unseasonable aggravation of symptoms during and following high winds in this dry area of Southern Nevada can be explained on such a basis.

Molds and Pollen Survey. In this State where but little rainfall occurs and the moisture content of the air is consistently low, the mold problem is not as important as that found in the coastal areas.

A botanical survey of the State is difficult to present in any dogmatic fashion The survey must of necessity be a general one since the extreme northern portion of the State is botanically quite different than that at the extreme southern boundary.

Since the center of population occurs in and around the Las Vegas and Reno areas, they could be used, according to Townsend,[1] as representative of the flora of the State. Exceptions can be frequent however.

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[1] Personal Communication, Robert Townsend, Botanist, Hollister-Stier Laboratories.



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British Columbia and Alaska

By Robert F. E. Stier, M.D.

BRITISH COLUMBIA

GEOGRAPHY. This Province of Canada is bounded on the west by the Pacific Ocean and Alaska, on the north by the Yukon and Northwest Territory, on the east by the Province of Alberta and on the south by the entire States of Washington, Idaho and the west portion of Montana The centers of population are near the United States border, where Victoria and Vancouver in the west, and Trail, Nelson and Cranbrook in the eastern portion of the Province are the largest cities

The Province is subdivided by two main mountain ranges that traverse the entire Province from north to south. The Cascade Mountains are the major western range while the Rocky Mountains are the main eastern range Other ranges of mountains traversing the province and subdividing the province still further are the Selkirk, Slocan and Monashee Mountains. At the bases of these Ranges of Mountains are some of the most picturesque lakes on the North American Continent. Kootenay Lake, about 90 miles long and the Arrow Lakes, almost 100 miles long, are outstanding in Eastern British Columbia, but in Central British Columbia are many smaller lakes nestled in among high mountain ranges and peaks Snow remains on many of these peaks the year around and many glaciers are found on these mountains

The coastal area is broken up into numerous deep fjords which lend a Scandinavian atmosphere to the Switzerland of the interior.

Much of the coast line is protected by islands, the largest of which is Vancouver Island, that measures 282 miles in length and has an average width of from 50-60 miles.

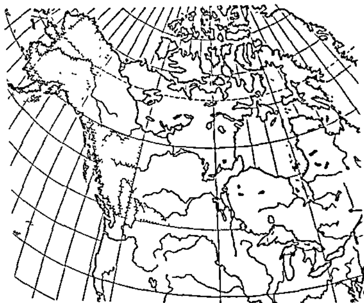


TABLE I
HAY FEVER PLANTS IN BRITISH COLUMBIA

Pollen	*Prevalence* *Western*	*Eastern*	*Time of Pollination*
Trees			
Alder *(Alnus oregona)*	++++	+	March-May
Aspen *(Populus tremuloides)*	+	+	March-May
Ash *(Fraxinus oregona)*	–	+	March-May
Birch *(Betula species)*	+	+	March-May
Black cottonwood *(Populus trichocarpa)*	+	++	March-May
Box elder *(Acer negundo)*	+	++	April-May
Fir, Douglas *(Pseudotsuga taxifolia)*	+	+	April
Garry's oak *(Quercus garryanna)*	++	–	April
Hazelnut *(Corylus californica)*	++	–	March-April
Maple *(Acer macrophylla)*	++	+	May
Willow *(Salix species)*	++	+	February-April
Yellow pine *(Pinus ponderosa)*	–	+	June
Grasses			
Annual June *(Poa annua)*	+	+	May-September
Bent *(Agrostis maritima)*	+++	–	June-August
Canada blue *(Poa compressa)*	+	+	July-September
Italian rye *(Lolium multiflorum)*	++++	–	May-July
Kentucky blue *(Poa pratensis)*	+++	++++	May-September
Meadow fescue *(Festuca elatior)*	+	++	May-June
Orchard *(Dactylis glomerata)*	++++	++	May-July
Perennial rye *(Lolium perenne)*	+++	–	May-July
Quack *(Agropyron repens)*	++	+	June-September
Red top *(Agrostis alba)*	++	+	June-August
Smooth brome *(Bromus inermis)*	+	+++	May-June
Sweet vernal *(Anthoxanthum odoratum)*	++	–	April-May
Timothy *(Phleum pratense)*	++	++	June-July
Tall oat *(Arrhenatherum elatius)*	+++	–	May-June
Velvet *(Holcus lanatus)*	+++++	–	May-July
Weeds			
Atriplex *(Atriplex hastata)*	–	+	August-September
Bitter dock *(Rumex obtusifolius)*	++	–	August-September

Pollen	Prevalence Western	Prevalence Eastern	Time of Pollination
Common sagebrush *(Artemisia tridentata)*	-	++	August-September
Dandelion *(Taraxacum taraxacum)*	++++	+++	May-September
English plantain *(Plantago lanceolata)*	+++	++	June-September
False ragweed *(Fransena acanthicarpa)*	-	++	August-September
Giant poverty *(Iva xanthifolia)*	-	++	June-August
Giant ragweed *(Ambrosia trifida)*	-	-	August-September
Green sagebrush *(Artemisia dracunculoides)*	-	++	August-September
Lamb's quarters *(Chenopodium album)*	++	++	June-October
Mexican fireweed *(Kochia scoparia)*	-	+	July-August
Mugwort *(Artemisia vulgaris)*	+	++	June-August
Rough redroot pigweed *(Amaranthus retroflexus)*	+++	+++	July-September
Russian thistle *(Salsola pestifer)*	-	++	July-August
Sheep sorrel *(Rumex acetosella)*	++	+	May-June
Short ragweed *(Ambrosia elatior)*	-	-	August-September
Small poverty *(Iva axillaris)*	-	+	June-August
White sagebrush *(Artemisia ludoviciana)*	-	+	August-September
Yellow dock *(Rumex crispus)*	++	+	May-October

Symbols Showing Relative Abundance of Hay Fever Plants

+++++ The most abundant
++++ Very abundant
++++ Abundant
+++ Common
++ Occurs in isolated patches
+ and without symbol, scarce

The dates of pollination are approximate They vary with location and season

The Capital of the Province, Victoria, is located at the southern extremity of this Island

Climate. The climate varies with the locality. West of the coast mountains, the average day temperature for Victoria is 61° in the summer, while in the winter it would average 42°. The mean temperature for the coastal area however, is about 51° while inland the mean temperature is about 48°. The

summer temperature is about 60° and the winter temperature is about 40° on the coast, while inland the summer temperatures are about 61° while the winter temperatures average about 24°. Snow seldom occurs on the coast while inland, particularly in the higher altitudes, snow comes as early as November and remains until late spring.

The rainfall for Victoria is 27 inches as compared with 58 inches in Vancouver. Inland in Central British Columbia there is but 10 inches of rainfall for the year.

Social Structure. This province has a variety of industry. In the inland, mining, lumber and agriculture predominate while in the coastal areas, fishing, particularly salmon, is the predominant industry. The large seaport of Vancouver ranks second in Canada, handling largely the grain and lumber from the interior.

Mining is an important industry in that area around Trail and Nelson. The largest nonferrous metallurgical plant in the British Empire is located at Trail. Coal is extensively mined in the extreme eastern part of the Province near Cranbrook and Kimberly.

In view of its many scenic advantages, hot springs, fishing and hunting, the tourist business in British Columbia is very important

Agriculture is important for the Province but the growing season is short in most areas except on the coast. Cattle, sheep and dairying are important in the inland areas.

Higher educational facilities are confined to the University of British Columbia at Vancouver and Victoria College (Junior College) at Victoria.

In seaports, such as Vancouver and Victoria, unusual allergenic factors can be expected Sometimes they are most unexpected and require study and evaluation as they arise since much of the trade through this port is with the Orient, Australia, New Zealand, etc. As in hard rock mining in the United States, so in this Province silicosis must be ruled out in the asthmatics.

Mold and Pollen Survey. The molds become a factor in the coastal areas and here *Hormodendrum* and *Alternaria* are

probably the most important. Spores from the ferns that grow abundantly in this coastal area have been found to be allergenic and must be considered factors.

Few weeds are pollen factors in the coastal area. English plantain, redroot pigweed, dandelion and the rumex family, including sheep sorrel, are probably the most important.

In the inland area, the surveyor of the plants has a difficult problem since the variation in altitude means a distinct variation in the local flora. For example, the towns of Trail and Rossland are only seven miles apart yet there is a difference of more than 2000 feet in altitude Rossland escapes many of the common weeds found in and around the lower altitudes of Trail and the Kootenay and Columbia River valleys.

In these valleys and those of the East Kootenay, the weeds found in the dryland areas of Montana, Idaho and Washington also occur Many of the sages are a distinct weed problem Neither the short or tall ragweed are found here but the false ragweed is present and becomes a problem whenever it is found in a locality

Scotch brome and spirea is used in many areas as a hedge or windbreak and where it is abundantly grown, it must be considered a potential factor in those patients who are sensitive to this insect pollinated shrub

Even though dandelion is not considered a factor in many areas, it occurs so abundantly that symptoms are produced in those patients who are sensitive to this flower and it is therefore grouped among the weeds.

ALASKA

Geography. Alaska consists of three distinctive regions.

(1) The Main Territory, bounded by the Arctic Ocean on the north, the Bering Sea on the west, the Pacific Ocean on the south and Canada's Yukon Territory on the east

(2) The Panhandle or Southestern Alaska, comprising the narrow fringe of the Continental Coast together with the adjacent islands and

(3) The Aleutian Archipelago, composed of the islands

westward from the Alaska Peninsula, including Attu and Kiska.

Alaska has five major mountain ranges with elevations ranging upward to 20,300 feet. The snow capped peak and glacier formations of these mountains, in contrast with flower-covered valleys, make Alaska a scenic wonderland. Mt. McKinley, 30,300 ft. is the highest peak on the North American Continent.

TABLE II

TOTAL AIR-BORNE ALLERGENS

	Pollens	*Lycopodium Spores*	*Bracken Spores*	*Fungus Spores*	*Total*
Juneau	127	0	55	77	259
Fairbanks	76	13	0	736	825
Nome	176	0	0	9	185

The Yukon River, in its bow-shaped course of 1,500 miles from the Canadian boundary to the Bering Sea, receives three large navigable tributaries, the Porcupine, Tanana and Koyukuk. The Yukon watershed together with the sections of Alaska along the Pacific Coast comprise the greater part of the habitable regions of the Territory

The lands considered suitable for homesteading and cultivation are in relatively limited areas, located along the southern coast and in the broad interior valleys. In general, almost all kinds of hardy vegetables and berries and some grains can be raised on favorable locations south of the Arctic circle.

Climate. Alaska was once referred to as "Seward's Icebox," yet actually, this territory enjoys an average climate generally considered mild. Three-fourths of the territory is in the North Temperate Zone and only one-fourth is north of the Arctic Circle. Variations of temperature are extreme, though for the most part is considered equable. In Southeastern Alaska there is no great variation between summer and winter temperatures. In the southern portion of the Territory, the weather is quite similar to that of Vancouver, British Columbia and Seattle, Washington. The minimum January temperature averages

TABLE III

HAY FEVER PLANTS IN ALASKA

- *Trees*
  - Thin leaf alder (*Alnus sinuata*)
  - Mountain alder (*Alnus incana*)
  - Aspen (*Populus tremuloides*)
  - Ash (*Fraxinus oregona*)
  - Birch (*Betula species*)
  - Black cottonwood (*Populus trichocarpa*)
  - Box elder (*Acer negundo*)
  - Fir, white (*Pseudotsuga*)
  - Garry's oak (*Quercus garryanna*)
  - Maple (*Acer macrophylla*)
  - Willow (*Salix species*)
  - Lodgepole pine
  - Spruce
- *Grasses*
  - Annual June (*Poa annua*)
  - Kentucky blue (*Poa pratensis*)
  - Canada blue (*Poa compressa*)
  - Bent (*Agrostis maritima*)
  - Italian rye (*Lolium multiflorum*)
  - Perennial rye (*Lolium perenne*)
  - Wild rye (*Elymus glaucus*)
  - Meadow fescue (*Festuca elatior*)
  - Orchard (*Dactylis glomerata*)
  - Quack (*Agropyron repens*)
  - Red top (*Agrostis alba*)
  - California broome (*Bromus carinatus*)
  - Sweet vernal (*Anthoxanthum odoratum*)
  - Timothy (*Phleum pratense*)
  - Tall oat (*Arrhenatherum elatius*)
  - Velvet (*Holocus lanatus*)
- *Weeds*
  - Bitter dock (*Rumex obtusifolius*)
  - Yellow dock (*Rumex crispus*)
  - Dandelion (*Taraxacum taraxacum*)
  - English plantain (*Plantago lanceolata*)
  - Lamb's quarters (*Chenopodium album*)
  - Mugwort (*Artemisia vulgaris*)
  - Rough redroot pigweed (*Amaranthus retroflexus*)
  - Sheep sorrel (*Rumex acetosella*)
  - Pickleweed (*Salicornea ambigua*)
  - Western sage (*Artemesia suksdorfii*)
  - Silver beachweed (*Franseria bipinnatifida*)

about 25° while the high summer temperature is about 65°. Inland at Fairbanks, the average minimum temperature in January is minus 10° but the summer average during June and July reaches into the seventies.

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- Orchard (*Dactylis glomerata*)
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- Red top (*Agrostis alba*)
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- Timothy (*Phleum pratense*)
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- Velvet (*Holcus lanatus*)

Weeds
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Precipitation in coastal areas is heavy, exceeding in som sections that of any locality in the Continental United State At Ketchikan, it totals 150 inches a year. As one progress inland, it generally decreases and the seasonal temperatur variation is then much more pronounced.

Social Structure. The chief industry in this territory is fisl ing and fish canning. Next in importance is mining. Gold, si ver, antimony, tin, coal, copper, iron, lead and platinum ar among the important minerals mined. Lumbering, fur trap ping and even farming make up a considerable part of the ir dustry of Alaska.

The educational facilities include two separate school sys tems. (1) Public schools for children of all races under the di rection of the Territorial Department of Education (2 Schools for Indians and Eskimos under the direction of th Alaska Native Service, U. S. Office of Indian Affairs. The onl institution of higher learning is the University of Alaska, nea Fairbanks

Most of the larger towns have private hospitals, physicians dentists and nurses in private practice

Molds and Pollen Survey. There has been no complete bo tanical survey made of Alaska as it pertains to hay fever pro ducing plants.

According to Durham,* no ragweed pollen was found or 276 slides made in Nome, Fairbanks and Juneau He also states that the possibility of inhalent allergy from pollens and molds is Alaska should be minimal because of the light ex- posure to grass pollen in early June and July. The authors' experience, however, has been to the contrary. Patients who have symptoms from a grass and mold sensitivity in the Seattle, Vancouver, B C area will invariably have symptoms in the Southwestern area of Alaska when the grasses and weeds are actively pollinating.

The author has used the following list of plants as a

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* Durham, O C., Atmospheric Allergens in Alaska *J Allergy, 12*:307, 1941.

guide for furnishing test materials and treatments for the territory of Alaska. From the results that patients have reported, our assumption in regard to the occurrence of these pollen factors must be correct. We have had no experience with molds as factors in the territory but one can assume that in the southwestern area where the weather is temperate most of the year and the air is usually saturated with moisture, molds should be a factor. Those that are factors along the west coast of British Columbia, Washington and Oregon will be factors in this section of Alaska.

27

The Pacific Northwest—West of the Cascade Mountain Range

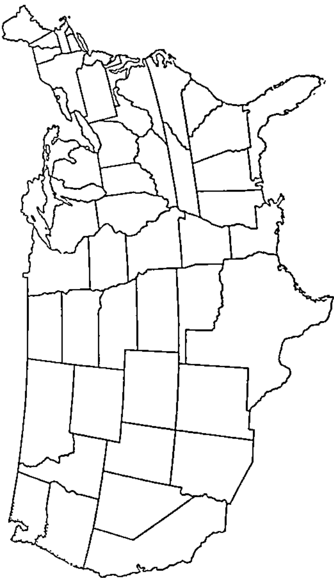
By Frank Perlman, M.D.

GEOGRAPHY. The area of the States of Washington and Oregon west of the Cascade Mountains can well be considered, for this discussion, as a unit, and it is markedly different from the eastern portion of these States. The western area is itself again split by the Coast Range and the Olympics into a coastal strip and a valley area. Nearly all of the urban centers of these two States lie in the valley area. This area is comprised principally of the Willamette River Valley in Oregon and the Puget Sound Area in Washington.

There is a great variation in the topography of Western Oregon and Washington, but typical are the rolling hills and mountains, covered with coniferous trees interspersed with fertile farmland and many rivers, lakes, and bays

The wooded hills extend right to the rocky coast, along which there are several fine bathing beaches and several good harbors for the fishing fleets.

Climate. This area enjoys the modulating effects of maritime air masses, the climate is mild, uniform, and relatively humid except during the warmer summer months As the air masses move across the higher Cascades, they lose by precipitation a considerable part of their moisture, causing the eastern area of the States to be dry with much greater temperature extremes Along the coast the normal annual precipitation is near 75 inches, increasing to as much as 130 at some of the higher elevations in the coastal range. In the western valleys it varies from about 18 to 50 inches. The average in Seattle is 34 inches which is the same as that for Cleveland and Buffalo



In Portland the average is 42 inches, which is the same as that for Portland, Maine, and Washington, D. C The rain here tends to fall in longer lasting light showers, the thunder storms of the east being almost unknown.

Temperatures along the coast and in most of the valley do not go as low as zero and rarely reach 100°. There is a range of only 15° (45-60) between the coast average mean temperatures for January and July. In Seattle the January average is

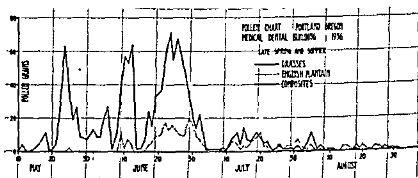


Fig 1

40° and the July average, 64°. In Portland the spread is from 39° to 67°.

Snowfall averages as low as an inch a year In the Rogue Valley of Southern Oregon the average is near 20 inches, in the Willamette Valley it varies from 6 to 13 inches, in the Puget Sound Area averages run even lower. At 6000 feet on Mt. Hood (half way up) the annual snowfall is about 465 inches.

While a cloudy sky is common the clouds are usually broken, and there are many clear days. The sun shines in Seattle 40% of the total possible hours. With the growth of industry in the Northwest, smoke has increased somewhat, but, because hydro-electric power is used to a great extent, smog has not been a problem except occasionally in a few specific localities.

Social Structure. Brief comments about the social structure of a large area must necessarily consist of generalizations, and

comments on an area which has been as continuously and rapidly growing as the Northwest are difficult. The first significant growth of the area occurred about 100 years ago with the arrival of hardy pioneers, mostly with New England background, who came over the Oregon Trail to cut out new farms from the wilderness; their traditions are still felt to some degree and are commemorated on holiday occasions. Later im-

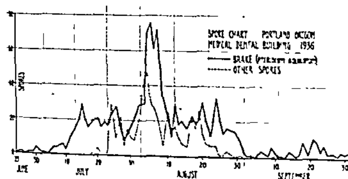


Fig 2

migration to the fisheries and lumbering was largely Scandinavian The advent of cheap electric power and the shipbuilding, aircraft, and other industries have brought in a technical and industrial population and developed the urban centers (the population increase between 1940-1950 was at least 35%), so that at present about half of the two states population lives in the cities and about half of the states income is received from manufacture

The backbone of this area's livelihood has always been, and remains to a lesser degree, in the forest industries, including lumber, plywood, pulp and paper Fisheries, particularly of salmon, agriculture, particularly in fruits and vegetables, livestock, and dairying are also important The cheap electric power produced by the Columbia River has made aluminum reduction an important industry. With aircraft production in

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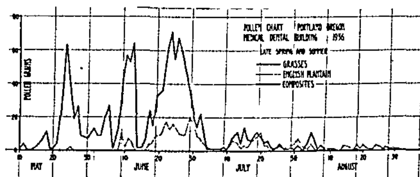


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Social Structure. Brief comments about the social structure of a large area must necessarily consist of generalizations, and

are very popular. The Puget Sound area offers, perhaps, the finest inland boating waters in the world. Excellent skiing is available nine months of the year.

Allergenic factors peculiar to Western Washington and Western Oregon are few. Because of the many rainy days during the winter months, more hours of indoor living result in a greater exposure to house dust than might occur in the sister

POLLINATING PLANTS OF THE PACIFIC NORTHWEST IN GENERAL ORDER OF THEIR IMPORTANCE

Grasses (Gramineae)
- Timothy *(Phleum pratense)*
- Red top *(Agrostis alba)*
- Velvet grass *(Notholcus lanatus)*
- Orchard grass *(Dactylis glomerata)*
- Kentucky blue grass *(Poa pratensis)*
- Perennial rye grass *(Lolium perenne)*

Trees
- Willow *(Salix spp.)*
- Lombardy poplar *(Populus nigra italica)*
- English walnut *(Juglans regia)*
- Birch *(Betula spp.)*
- Alder *(Alnus oregona)*
- Hazel *(Corylus californica)*
- Oak *(Quercus garryana)*
- Maple *(Acer spp.)*
- Box elder *(Acer negundo)*

Weeds (West of Cascade Mountains)
- English plantain *(Plantago lanceolata)*
- *Amaranthaceae*
  - Redroot pigweed *(Amaranthus retroflexus)*
- *Chenopodiaceae*
  - Goose foot, Lamb's quarters *(Chenopodium album)*
- *Compositae*
  - Mayweed, dog fennel *(Anthemis cotula)*
  - Daisy *(Chrysanthemum spp.)*
  - Dandelion *(Taraxacum officinale)*
- *Polygonaceae*
  - Sheep sorrel *(Rumex acetosella)*

state to the south. Some individuals in smaller communities, whose chief industry is the processing of pulp and paper, complain of sulfur fumes precipitating or accentuating their respiratory allergy. This is, of course, a chemical factor occurring occasionally and in rather localized areas. Among the numerous sawmill employees, one would expect frequent in-

the lead, manufacturing has become very widely diversified, with nearly every type of trade being represented.

Portland and Seattle are important seaports and have a large trade with Alaska and the Orient.

What with their rapid growth, the cities of the Northwest, like many other parts of the country have felt a housing shortage. Construction of both private dwellings and apartments, however, has been at a very high rate, and the situation is continually improving. Housing of all types is available—at a

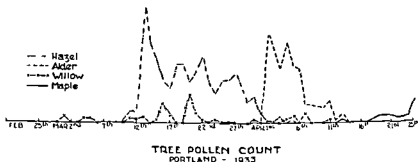


Fig. 3

price. Most housing being built is suburban—and all suburban areas are only a few minutes drive from city centers.

At the 1950 Census, Seattle's population was 462,440 and Portland's was 371,011, each has a considerably larger metropolitan population Each offers all of the advantages of a large metropolitan center in the way of shopping facilities, entertainment, schools, libraries, and churches, all nation-wide religious denominations being represented

It might be of interest to note that liquor is State controlled by both States. In each State, however, liquors by the drink can be purchased at the various cocktail lounges.

Although Portland and Seattle have been discussed as the largest cities in the area, a fuller discussion should include the many fine smaller cities and towns of the area. It is perhaps away from the cities that the virtues of the Pacific Northwest are most apparent, for it is a great outdoor sporting area. Hunting and fishing are unexcelled Boating, swimming, and skiing

are very popular. The Puget Sound area offers, perhaps, the finest inland boating waters in the world Excellent skiing is available nine months of the year.

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stances of sensitivity to wood or sawdust. Contact dermatitis is not an uncommon occurrence. Asthma from sawdust has, in this author's experience, been proved on only two patients by positive skin reaction, passive transfer, and response to specific therapeutic measures.

The mold survey has not been done in as great detail here

TABLE I

POLLEN SURVEY–1949

Portland, Oregon

*(Slides exposed on top of Medical-Dental Building in downtown area)**

	Mar	*Apr.*	*May*	*June*	*July*	*Aug.*	*Sept*	*Oct.*	*Total*
Willow	16								16
Hazel	36	7							43
Alder	102	229	30						361
Elm	9	50	6						65
Cedar	57	90	22	15					184
Poplar		15							15
Ash		2	36	2					40
Maple		2	42		2				46
Birch		61	8						69
Oak			13	2					15
Box elder			10						10
Horse chestnut			16						16
English walnut			38	7					45
Ceanothus			8						8
English plantain	4		11	42	44	19	8	2	130
Chenopod-Amaranth	14			6	4	20	4		48
Grass		4	206	620	206	54	12		1102
Sage							14		14
Ragweed				4		3	4		11
Miscellaneous		4		2	6				12

* The months of Jan., Feb., Nov., Dec. showed no pollens.

as in other portions of the United States. Some reports have mentioned its importance in the Puget Sound Area. *Alternaria* and *Hormodendron* are found in sufficient number on exposed slides throughout the summer and autumn to be of allergenic significance. The smuts and rusts are of less importance than is found in the eastern portion of the Pacific Northwest with its expansive wheat fields. *Bracken* spores are profuse on the exposed slides but have never been proved allergenic. Many unidentified spores warrant further study.

Pollen Survey. In presenting the pollen survey it is necessary to clarify and correct the misconception resulting from the description in most texts on aerobiology on the unity of the Pacific Northwest. Again, it is pointed out that the Cascade Mountain Range divides both Oregon and Washington into eastern and western verdant portions—so that Eastern Washington resembles very closely Eastern Oregon, while Western

TABLE II

POLLEN RECORD FOR OLYMPIC NATIONAL PARK, WASHINGTON

	Elwha 1947	*Elwha and Headquarters 1948*	*Hurricane Ridge 1948*
Cedar	6	10	0
Grass	37	1,426	914
English plantain	1,149	1,343	0
Sedge	0	0	51
Red sorrel	0	11	0
Chenopod	12	0	10
Sagebrush	0	2	4
Composite	4	4	85*
Ragweed	4	7	7
Miscellaneous	8	70	34

* 86 of these on one single slide.

Washington offers, from the standpoint of allergenic flora, the same problem as its counterpart in Oregon to its south. Had the pioneers and later politicians concerned themselves with pollinosis, perhaps the Cascade Range from north to south would have been a state boundary line instead of the Columbia River running westward into the Pacific Ocean. The hay fever sufferer living west of the Cascade Mountains obtains prompt relief by crossing into the eastern portion of the States, and the reverse is likewise true.

This discussion is confined, of course, to the western portion of the Pacific Northwest. Along the Pacific shores the heavily forested coastal range comes almost to the ocean's edge, and so the seashore resorts are havens for the pollen-sensitive patients. Several grazing areas along this expansive

coast are minor exceptions and of no consequence. The forests of both States offer vacationers and sportsmen full protection from most varieties of offending pollen.

In Western Oregon and Washington, the pollens of grasses are of first importance. The counts of this group reach symptom-producing proportion between May and mid-July. Many new arrivals to this area, who had mild distress from grass pollen in other areas of the United States, will have great distress from such pollen here. Sweet vernal may pollinate even in March, and some grass pollens may appear in small numbers as late as October. Velvet, orchard and perennial rye grasses are some of the most prolific producers of pollen, while timothy plays a relative minor role here as contrasted to its importance elsewhere

TABLE III
POLLEN RECORD FOR MT. RAINIER NATIONAL PARK, WASHINGTON
1947

	Longmire	*Paradise*	*White River*
Ragweed	0	12	4
Chenopod	2	7	0
Grass	929	45	3
Sage	1	2	0
Plantain	22	15	2
Sedge	0	55	0
Red sorrel	5	0	0
Miscellaneous	2	3	0

The tree pollens are second in importance in this Northwest Area west of the Cascades, with willow, hazel, birch and alder appearing in late February and early March The season is short but may, in the case of alder, be quite intense. This is followed by poplar, maple, oak and box elder. In the Willamette and Tualatin Valleys of Oregon, there are many trees and orchards of filbert and English walnut, resulting in a number of isolated cases of sensitivity to their pollens The filberts may pollinate before the late December frost and complete their blooming period in February. The English walnut pollinates

in late April and May, overlapping the beginning of the grass period, which is often confusing to the uninitiated.

In addition to the trees and grasses, certain unrelated groups of weeds deserve identification. First and foremost is English plantain, whose period of pollination is long although moderate in intensity, extending from May to late summer, with its greatest intensity from late June to August. Many failures in obtaining adequate relief from treatment with pollen extracts can be attributed to the omission of English plantain pollen from the extract

TABLE IV

POLLEN SURVEY—1952

Portland, Oregon

(Slides exposed on top of Medical-Dental Building in downtown area)

	Jan	*Feb*	*Mar.*	*Apr*	*May*	*June*	*July*	*Aug*	*Sept.*	*Oct.*	*Nov*	*Total*
Elm	9	70	158	53								290
Juniper	19	55	220	244	49	5						592
Birch	2	21	100	57	4							184
Willow			36									36
Hazel	19	114	27									160
Alder		26	575	558	4							1163
Poplar		15		13								25
Ash			10	129	38							177
Walnut				4	65							69
Hemlock				55	25							80
Maple spp				133	119							252
Oak					32							32
Grass				62	114	198	72	68	22			536
Red sorrel				418	102	48	27	34	78	14		721
Plantain					6	351	138	94	42			631
Lamb's quarters						4	10	89	35			138
Bracken spores							53	608	23	97	21	805
Ragweed								83	54	22		159
Miscellaneous	32	108	146	185	90	28	8	72	100	10	4	783

Of the other weeds, red root pigweed, sheep sorrel and goose foot are of lesser importance, occurring in mid and late summer. The heterogenous composite family produces pollens which are not of great importance because they are not primarily wind-borne These include daisy, dandelion, mayweed, tansy ragwort and dog fennel. In the case of dog fennel, there

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28

Colorado, Eastern Wyoming and Western Nebraska

By Frank T. Joyce, M.D.

COLORADO

GEOGRAPHY. Many people who have never visited Colorado imagine it to be a land of mountains. Actually, there are three distinctive geographical features which are sharply separated From east to west they are: the great plains, the mountains, and, the high mesas and arid plateaus of the Western Slope The continental divide approximately bisects the State from north to south

Almost all of the eastern half of the State is a part of the great plains A high, semi-arid land rising from about 3,500 feet on the eastern edge of the state to 6,000 feet where it meets the mountains Except along creeks and the few rivers, trees are absent. Originally covered by native grasses, this land is now largely blanketed by wheat fields. Some large grazing areas remain In addition to dry-land farming the river valleys of the South Platte (in the Northeast) and Arkansas (in the Southeast) are irrigated and intensively cultivated

The foothills and front ranges of the Rocky Mountains arise *abruptly* from the plains in a long, slightly-interrupted line from north to south This sudden change of contour is impressive and from Denver one can see about 150 miles of this sweeping front. Many of the high mountains (14,000 feet) are in the front ranges Behind these are other high ranges running in other directions, some of which form the boundaries of three large basins These basins are called North Park, Middle Park, and South Park Each of these basins (Parks) have an

are in Clackamas County south of Portland sufficiently abundant pollens to produce symptoms in April and May.

As for ragweed, in this portion of the Pacific Northwest it has never been responsible for seasonal hay fever. For many years it has been categorically stated that this weed did not exist here. In the past few years several isolated patches of the short ragweed have been identified in the Willamette Valley of Oregon. An occasional pollen grain of this weed has been discovered on the slides exposed in Portland. It is no surprise that such scattered patches have been found—rather, it is a source of wonder that this noxious weed has not long since invaded the innumerable cultivated fields and orchards.

Because the ragweed is still limited to small isolated areas (and is as yet producing no trouble even for the many midwesterners who migrated here to escape their yearly affliction), civic and health groups, as well as the newspapers and many individuals, are making strong efforts to arouse public interest in retaining this area as a haven for the sufferer from ragweed hay fever. It is indeed important that vigilance and effort at continuous weed control be maintained in this regard The rest of the United States is constantly reminded of the delightful, moderate summer climate, the ragweed-free national parks, the scenic beauty and other numerous attractions for the vacationer and sportsman here in Western Oregon and Washington After mid-July the local pollen counts are low—therefore, the local responsible civic and health organizations will no doubt, through their efforts, assure the visitor that ragweed will not invade this vacation land.

area of several hundred square miles. Middle Park is rough and traversed by mountain ranges though the others are fairly flat or bowl-shaped. The parks are high (8,000 feet) and somewhat wetter than the plains. Though the growing season is short there is hay and grass for cattle and sheep ranches. Below South Park, in the south central part of the State, is the large flat, semi-arid San Luis Valley. Though this valley receives less than eight inches of moisture a year, it is intensely cultivated by means of surface irrigation and wells.

The evergreen forests occur chiefly on the mountain sides or on top of the high plateaus and mesas They become more dense as they climb the moist slopes to timberline.

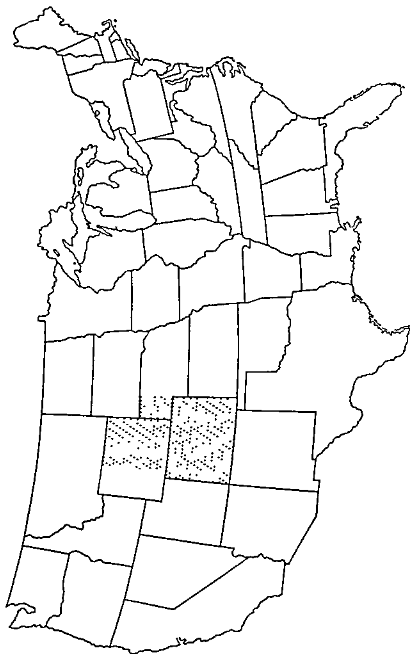
Spreading westward from the mountains are the high, large plateaus and mesas. These are from 8,000 to 10,000 feet high, heavily forested and visited only in the summer months. This is the Western Slope. A number of large rivers cut through the plateaus running west to eventually join the Colorado Leading to the rivers are numerous canyons and gulches. The larger valleys are cultivated in alfalfa and fruit orchards.

EASTERN WYOMING

Geography. The eastern half of Wyoming is a westward projection of the great plains. This area is higher, 5,000 to 7,000 feet, than the plains of Eastern Colorado and is broken up by plateaus, rolling hills and rivers. The transition from plains to mountains is more broken than in Colorado The land is *semi-arid* but will support wheat The river valleys are irrigated and cultivated Away from the valleys are sheep and cattle ranches

WESTERN NEBRASKA

Geography. The western part of the State is part of the great plains Flat or slightly rolling, they climb from about 2,000 feet to 5,000 feet in the northwest. As the land rises to join Eastern Wyoming it is broken up by irregular tables and sand hills Most of the population of this area is concentrated along the Platte River



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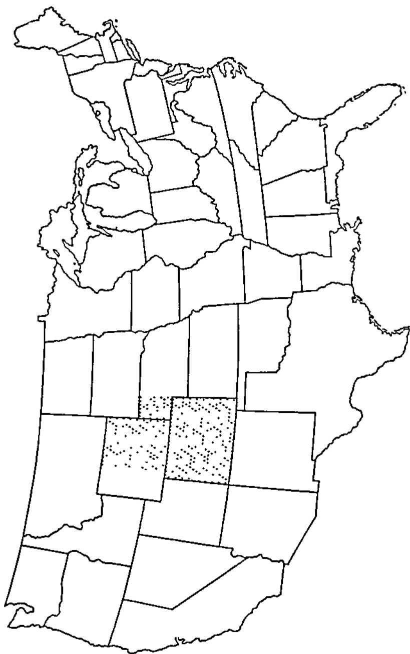
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special attention should be given to the climate of this area. At elevations of 4,000 to 6,500 feet the cities stretch from north to south in a narrow band on the eastern side of the front ranges. While no one can do anything about the weather, the people in these cities can, within one or two hours, drive to an entirely different climate 30 miles away at elevations of 8,000 to 10,000 feet—or higher. There are probably very few areas in the country where a pollinosis patient can so conveniently escape his offenders for a few hours, a weekend, or longer. The average July temperature of this foothill area (Denver) is about 72° and temperatures over 95° are relatives infrequent The nights are cool and fans in the residential areas are unnecessary. Light thundershowers occur in the summer afternoons The high altitude and proximity to the high mountains cause many people to suppose that the winters are very rugged. A few severe cold spells, 15° below 0 , may occur in January and February, but the mean temperature for January is 30 7°—cold, but dry, and more tolerable than the temperature reading would indicate This foothill area lies closely against the high ranges to the west and is out of the path of most of the blizzards which sweep the plains to the east It is a protected area which is notably warmer than either the plains or mountains Light snows occur as late as early June or as early as mid September

Obviously, the mountain area is cool in the summer and very cold in the winter Snow is present on the ground most of the winter and resorts in this area are developing rapidly

The valleys on the Western Slope have a rather uniform climate and is much less severe than either the foothills or the plains Severe cold and blizzards are rare In the summer the days are hotter and drier and rainfall is very much less than on the plains

EASTERN WYOMING AND WESTERN NEBRASKA

Climate. Both of these areas are part of the great plains and the climate is essentially the same as described for Eastern Colorado Being farther north and away from the mountains they are swept by the cold air movements out of Central Cana-

COLORADO

Climate. Because of the varied topography and differences in altitude, Colorado has a variety of climates. Great differences may exist within very short distances. The relation of altitude to climate is reasonably consistent above 7,000 feet, i e., the higher, the cooler and wetter. Below this altitude, on the other hand, a great deal depends upon whether one is speaking of the plains, the foothills of the front ranges, or, the Western Slope.

In general, the climate of these areas is pleasant most of the year and not too disagreeable at any time. Cool in the summer, not too cold in the winter and relatively dry the year round. Prolonged stormy days are rare and the sun shines 67% of the possible time. The annual mean relative humidity is 52%, varying from 50% to 60% in the morning to 30% to 40% in the afternoon. Dew is not too common. The combination of these factors produces an invigorating climate. Smog and fog are not problems even in the larger cities Smoke is a nuisance only in a few localities. However, within this generalization, there are differences which should be pointed out

The climate of the plains, 4,000 to 7,000 feet, is continental and semi-arid. Annual rainfall varies from 10 to 17 inches, there is a low relative humidity and a high wind movement, 5 to 10 miles per hour The rather constant wind is annoying to many people Though the days may be hot, 90° or above, in the summer, the nights are cool, dry, and there is usually a breeze During the winter the blizzards of the north may sweep over these plains and this area is definitely colder than the foothills. Part of this area was the "Dust-Bowl" and some dust is still blowing Many people have blamed the dust storms as the principal initiating factor of pulmonary disease but exact proof of this is not evident. However, some of the localized dust storms in the east and southeastern part of Colorado can make anyone very uncomfortable and might well aggravate asthma

Because most of the newcomers arrive first in the larger cities which lie in or against the foothills of the front ranges

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it is not primarily a manufacturing city. The many branch offices of the Federal Government and several large military and Air Force installations located in or near Denver have earned it the name of "Second Washington." Its central location and pleasant climate have attracted to this area the central offices of several nationally known industries. New homes and schools are being built but conditions are still crowded. Other large cities of Colorado have similar but less pressing problems of their own. In general, medical care is adequate. Denver and Colorado Springs have a very high ratio of physicians and other professional groups per 1,000 people.

The mountains are practically at the back door of almost all of the larger towns and cities Recreation facilities are abundant, varied, and easily accessible.

Both residents and newcomers often remark that wages and salaries are much lower here than in other parts of the country. Statistics which can be used for comparison with other areas and cities are now available for certain professions, laborers, and office workers Obviously, there are no figures at hand for executive positions, merchants, salesmen, or similar examples of private enterprise The mean net income of physicians for Colorado is lower than all other states except those of New England, New York, Arkansas, and Mississippi Both the mean and median net income of Colorado's lawyers are the lowest in the nation The dentists, compared to other dentists, are much better off than either the physicians or lawyers since their mean net income is exceeded only by their colleagues of the Far Western States While a comparison by states is not too good an index, a comparative study of Denver with other large cities revealed the same general tendencies.

A review of the minimum union hourly wage scale of July, 1951, for bricklayers, carpenters, electricians, painters, plasterers, and plumbers for 10 widely scattered cities showed considerable variations among the cities. The local wage scales for all unions except bricklayers and plasterers were lower than the average Percentage wise, the differences are not too significant except when compared to the Far West. In a study

da. Severe blizzards and snow storms may occur in the winter. Cheyenne is about 1,500 feet higher and 90 miles north of Denver, yet the seasons are two weeks later and the winter temperatures very much colder. The summers are fairly hot in Western Nebraska which is generally lower than Wyoming. These areas are semi-arid.

COLORADO

Social Structure. When gold attracted people to Colorado, mining camps, towns and even small cities were scattered over the mountains. As the gold played out the population shifted to the cities on the eastern edge of the mountains, the irrigated valleys, and a few to the plains. Following this period of activity people came to Colorado because of the alleged benefit of this climate for pulmonary diseases, especially tuberculosis and asthma Many were helped, enough, at least, to bring about the establishment of several sanatoriums for the treatment of pulmonary diseases (chiefly tuberculosis) by national fraternal and religious organizations Many people still come to Colorado for bronchial asthma. While some have been properly advised to come here, others have made the move and concomitant sacrifices without a trial visit. Among this latter group, many are doomed to disappointment and they will move on The physicians see those who do not improve or who have recurrences, and therefore have no method of estimating the number who do improve and remain well. Over the years there must have been a great many who remained well. The family histories of the present generation of allergic patients frequently reveal that an ancestor came here, and, "never had any more asthma." Despite the climate and improvement of the patient there are some who feel that they are "condemned to live here"

Mining now plays a less important role and agriculture is the leading factor in the State's economy. Tourist trade is a very large business and there are seasonal shifts of residents and tourists into and out of the mountains. The metropolitan area of Denver has rapidly expanded to over 500,000 and yet

ers. Medical care is adequate in the cities and most of the towns, however, one might live on a ranch and still be 20 to 30 miles from the nearest town. Opportunity for work is available but such positions are obviously not so plentiful as in the larger cities.

COLORADO, EASTERN WYOMING AND WESTERN NEBRASKA

Allergenic Factors. The effect of high altitude and low humidity on respiratory allergies are factors peculiar to these areas. The "high-dry" climate has been universally advised for asthma yet these effects may be both good and bad for the patient Three months should be allowed for acclimatization and this can be attained without difficulty since most people live between 3,500 and 6,500 feet So many variable factors are involved in a change of environment that any actual benefit of high altitude, per se, is difficult to evaluate One might suppose that the rarified air could be more easily breathed. However, since there are great variations in the severity of asthmatic attacks in the same individual the effect of a slightly less dense air on any given attack would be almost impossible to estimate The frequency of attacks of asthma in relation to high altitudes is effected only in so far as altitude diminishes the weed population and exposure to other extrinsic factors Clinical experience of one who has observed asthmatics in both low and high altitudes reveals little difference when many patients are concerned, yet, there are those who insist that their attacks are consistently less severe,—they, "can breathe deeper" The lower oxygen content of the mile-high atmosphere appears to make no difference in the proportion of cases which are cyanotic or require additional oxygen except when the case is complicated by moderately advanced pulmonary emphysema or cor pulmonale

Studies of respiratory function in *normal*, acclimated individuals indicate that at 5,000 feet the maximum breathing capacity is not significantly different from figures obtained at sea-level This test measures the ability to ventilate the lungs

of 24 classified types of office workers for the same cities it was found that the weekly wage scales in Denver were barely equal to the mean scales in only five instances, and above the average in only one of the 24 types: general clerk, male. On the other hand, wage scales for Pittsburgh and Des Moines were generally lower than Denver. Atlanta, Dallas, and New Orleans revealed enough differences among the 24 types to be only slightly better off than Denver.

The evidence seems to confirm the remark that net incomes, salaries, and wages are lower in Colorado Why this should hold true in a progressive state is not easy to explain. The common explanation—and a difficult one to prove, is that people come to Colorado either because of their health or the climate and are willing to accept a lower income in order to remain here. The lower averages mentioned for Colorado and Denver were frequently not too far below national averages. And, if one stops to consider that Colorado is fairly close to the West Coast where incomes and wages are the highest in the nation, there is, indeed, a striking contrast.

Finally, one might suppose that with low incomes and average living costs, the average family income would be lower than national averages. According to the 1950 Census, Denver ranks twenty-sixth among the larger cities, yet the average family income for Denver was $3,488 and was exceeded by only eight other cities. Detroit, Chicago, Seattle, San Francisco, Minneapolis, Washington, Milwaukee and New York City. A possible explanation for this discrepancy may be that there are more Federal Government employees in Denver than any other city except Washington, and both husband and wife may be working.

EASTERN WYOMING AND WESTERN NEBRASKA

Social Structure. In these areas the cities are not large and they are spaced far apart Agriculture is the dominant factor and consists chiefly of wheat farming on dry land, irrigated valleys, and ranching. Most of the population of the entire area is concentrated along the North Platte and Laramie Riv-

aggravate the respiratory allergies. Almost without exception, a relative humidity of 35 to 50% in the patient's bedroom is desirable. Humidifying devices can and should be used.

Almost all of the homes built in this area in the last 15 years are heated with warm air furnaces which may aggravate the respiratory allergy patient whose chief offender is house dust. Heating is necessary, at night at least, from mid September until mid May. The common dust filters are notoriously inefficient except for gross dirt and lint and it is often necessary to separate the asthma patient's bedroom from the central furnace and use a supplementary source of heat for that room. Though this may be expensive the cost is less than that required to add an efficient electronic dust precipitating apparatus to a central warm air furnace Whether these factors are directly responsible or not, it is a fact that the rate of upper respiratory infection is more prevalent in this area than one would think, and, the incidence of acute rheumatic fever and pneumonia for this area are both higher than the national average for these two diseases

The ill effects of the exceptionally low relative humidity and excessive exposure to house dust in the homes in the winter months can be corrected. When this is done there is often a beneficial effect on uncomplicated cases of asthma and upper respiratory allergies due to inhalants The high altitude, the relatively low humidity, the cool summers and frequent days of sunshine bring about an increased metabolism which may help the atopic eczema patient, although these patients are less likely to be helped than respiratory allergies The low relative humidity may cause an aggravation of eczema in many patients

COLORADO, EASTERN WYOMING AND WESTERN NEBRASKA

Pollens and Airborne Mold Spores. Within this area one can find almost all varieties of allergenic pollens and airborne mold spores In general, the weed population is less than in the central Mississippi Valley area because of the lower rain-

and in normal individuals no differences would be expected. Unfortunately, I know of no published studies which have been carried out on asthma-free asthmatics at high altitudes. Within the study mentioned above, however, there was noted a distinct increase in the minute-volume respiration of normal individuals at 5,000 feet. The physiological explanation for this need not be discussed here except to explain that at rest a normal person breathes more air in and out of his lungs in a minute than he would at sea level. Pulmonary function studies have shown that there is an increased amount of trapped alveolar air during the asthma-free periods of the chronic asthmatic and the increased ventilation of the lungs which results from living at high altitudes may be beneficial to these patients. On the other hand, despite the increased pulmonary ventilation, the rarified air contains less oxygen and patients who have moderately advanced obstructive pulmonary emphysema are definitely more comfortable at lower altitudes.

The effect of a consistently low relative humidity on asthma or perennial nasal allergies is even more difficult to evaluate. Many patients are obviously worse in very humid climates, yet an unusually prolonged exposure to very low relative humidities can be harmful in a more subtle way because of the drying out of the mucous membranes The relative humidity during the summer months is low but not unusually low. During the winter this becomes a very important factor to the asthmatic patient. This is mentioned not because the problem is any different here than in any other area where winter heating extends over a period of many months, but because so much emphasis has been placed on the beneficial effects of a dry air by lay people in this area. In most homes the relative humidity of the sleeping room is rarely above 5 to 15% during the months of December through March. This is uncomfortably low, frequently producing a dry stuffiness of the nose and a hacking cough in healthy individuals and is obviously not good for the respiratory allergy case Under these conditions there is an increased rate of acute respiratory infections which

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COLORADO, EASTERN WYOMING AND WESTERN NEBRASKA

Pollens and Airborne Mold Spores. Within this area one can find almost all varieties of allergenic pollens and airborne mold spores. In general, the weed population is less than in the central Mississippi Valley area because of the lower rain-

fall. Consequently, pollen counts of all species are in most localities lower. An exception to this is the particularly high incidence of Russian thistle and related pollens in Northeastern Colorado and Western Nebraska and in the cultivated river valleys. The pollen seasons have rather sharp onset and termination and are not too long. Because of these factors the native pollinosis cases respond more favorably to specific pollen extract therapy than those who have a comparative degree of distress in areas where the counts are higher. *It is the pollinosis patient who receives the greatest benefit by coming to Denver or the mountainous areas of Colorado.* Many are completely relieved, particularly in the higher altitudes. Those who continue to have symptoms may gain further benefit from specific treatment. Despite the relief attained, however, the protection is only relative, and these patients quickly become worse on going (or returning) to an area of higher pollen counts. Because of the relatively lower counts for every offender here, the newcomer does not usually acquire sensitiveness to factors which are peculiar to this area.

TABLE I

POLLEN RECORD FOR MESA VERDE NATIONAL PARK, COLORADO
1948

	June	*July*	*August*	*September*	*Total*
Oak	6	0	0	0	6
Cedar (Juniper)	19	0	4	7	30
Wood rush	2	0	0	0	2
Grass	8	2	8	13	31
Russian thistle	8	24	37	6	75
Other chenopods	24	14	16	13	67
Composite	2	0	0	15	17
Sagebrush	0	0	3	74	77
Ragweed	0	11	14	72	97
Miscellaneous	4	4	0	2	10

PLAINS

Pollens and Airborne Mold Spores. The plains area of these states presents a homogenous pattern in pollen variety and

incidence except for the cultivated river valleys. The variations in the seasons due to latitude and altitude are as great as six weeks. The pollen seasons of Denver represent an approximate average for the plains area from Southern Colorado to Montana. The seasons for trees and grasses will be three weeks earlier or later as one moves from south to north. The

TABLE II

POLLEN RECORD FOR ROCKY MOUNTAIN NATIONAL PARK, COLORADO 1944

	July Estes Park	*July* Grand Lake	*August* Estes Park	*August* Grand Lake	*September* Estes Park	*September* Grand Lake	*Total* Estes Park	*Total* Grand Lake
Wood rush	12	2	0	0	0	0	12	2
Maple	4	1	0	0	0	0	4	1
Ragweed	5	1	55	15	89	4	149	20
Chenopod	28	11	60	10	25	1	113	22
Grass	55	16	78	81	6	0	140	97
Sagebrush	0	0	188	45	164	71	352	116
Composite	1	0	7	1	12	2	20	3
Miscellaneous	57	15	15	7	4	0	76	22

difference is not so pronounced so far as the weeds are concerned

Trees cause the least amount of trouble and such cases are usually urban. The most common offenders are: the cottonwoods or poplars *(Populus acuminata, P angustifolia, P Sargentii)*, box elder *(Acer negundo)* and maple *(Acer saccharinum)*, and the elms *(Ulmus americana* and *Ulmus pumila)*. The maples and elms are the earliest trees and bloom in late February with a peak in mid March The highest daily count was 67 per cubic yard of air Box elder usually cross reacts with the other maples but reaches a peak in mid April. The cottonwoods (poplars) are the most common offenders and produce considerable pollen in late April The highest daily cottonwood pollen count was 198 and occurred in early May. Ash *(Fraxinus americana)*, birch *(Betula fontinalis)*, cedar *(J. monosperma* and *J scopulorum)*, willow *(Salix nigra)*, and

scrub oak *(Quercus Gunnisonii)* are present in small numbers but may cause trouble in April and May.

The grass pollen season is fairly short because of the semi-arid nature of the climate. Some pollen is found on the slide in March but the peak occurs in May and June. Most of the grass-sensitive patients are reasonably comfortable after mid July, although midsummer rains may produce a late summer flare up. Bermuda grass and Johnson grass are not present.

TABLE III

ATMOSPHERIC POLLEN RECORD FOR DENVER

Monthly Totals for 1951

	Feb.	*Mar*	*Apr*	*May*	*June*	*July*	*Aug*	*Sept*	*Total*
Trees*	32	465	277	1225					1999
Grass		10	38	318	292	131	70	11	870
Chenopod-Amaranth					50	124	856	244	1274
Ragweed						29	772	288	1089
Sagebrush							87	836	923
Miscellaneous				10		23	77	26	136

* Deciduous only

Beginning in mid or late June the cottonwood cotton (seeds from the female trees) begins to blow and continues through July and early August. Many authorities have pointed out that grasses or early weeds are the cause of hay fever symptoms at that time rather than the cottonwood cotton. Patients have considerable difficulty in accepting this explanation since the blowing lint is a mechanical irritant Routine skin testing for cottonwood cotton has revealed a number of cases who show large positive skin reactions to cottonwood cotton. Positive passive transfer reactions have been demonstrated in some cases. There is no consistent correlation of these reactions to a skin sensitivity to cottonwood pollen. Treatment with cottonwood cotton extract alone has not been used frequently enough to determine whether patients may obtain relief.

The most common weeds of the plains area (including Denver, Colorado Springs and Pueblo) are members of the chenopod-amaranth group: Russian thistle *(Salsola pestifer),*

burning bush or Mexican fireweed (*Kochia scoparia*), lambs' quarters (*Chenopodium album*), pigweeds (*Amaranthus palmeri* and *A. retroflexus*), and western water hemp (*Acnida tamariscina*). Of these, burning bush or fireweed (*Kochia*) is extremely common. The common name of this plant is confusing since the leaves and stems of these wild varieties do

TABLE IV

ATMOSPHERIC POLLEN RECORD FOR DENVER

Monthly Totals for 1952

	Feb.	*Mar*	*Apr*	*May*	*June*	*July*	*Aug*	*Sept.*	*Oct*	*Total*
Maple		100	13							113
Elm		70	111							181
Birch			13	108						121
Cottonwood			519	292						811
Juniper			63	223	4					290
Unidentified Trees	23	2	2	22	14					63
Grass	2	6	26	50	276	50	8	24		412
Chenopod-Amaranth				14	50	148	596	90	6	904
Ragweed					4	65	644	396	32	1141
Sagebrush							72	290	30	392
Miscellaneous					16	6				22

not always turn red. Clinical experiences shows that this weed is less toxic than Russian thistle. Daily pollen counts for this group are not as high as one might expect—92 per cubic yard in mid August. Sugar beets are extensively grown in this entire area and though they belong to the chenopod family, non-blooming varieties are grown for the larger beets and they do not contribute to the pollen count. The peak pollinating period of this group is from mid July to late August and is earlier than the ragweeds and sages.

The ragweeds (*Ambrosia trifida* and *A. psilostachya*) are present in small amounts and do cause some allergy. Burweed marsh elder (*Iva xanthifolia*) is a very common ragweed but apparently causes little trouble. The highest daily ragweed pollen count in Denver during the 1951 season was 92 and occurred in late August, most of the pollen coming from bur-

scrub oak *(Quercus Gunnisonii)* are present in small numbers but may cause trouble in April and May.

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weed marsh elder. False ragweed *(Franseria acanthicarpa)* and cocklebur *(Xanthium spp.)* are relatively unimportant local members of the ragweed family. Sagebrush *(Artemisia tridentata)* and the related sages *(A. frigida, A. dracunculoides, A. ludoviciana)* are common and shed their pollen somewhat later than the ragweeds. The highest daily sagebrush count was 90 and occurred in mid September. Since the antigenic quality of the sagebrush pollens is almost identical with that of the ragweeds, specific sagebrush sensitization is difficult to recognize. Obviously all ragweed sensitive persons should avoid undue exposure to sagebrush.

MOUNTAINS AND WESTERN SLOPES

Pollens and Airborne Mold Spores. At elevations of 7,000 feet and higher there are not many offenders. Among the trees, cottonwood and aspen *(P. tremuloides)* may cause trouble in May. Scrub oak is present on the foothills on the eastern side and grows in a dense belt from 6,000 to 8,500 feet on almost all of the mountains on the Western Slope. It rarely grows higher than 15 to 20 feet and usually exists as heavy brush. It blooms in May, and, as common as it is, few oak-sensitive patients are seen. Cedars *(Juniperus spp.)* may cause trouble but they are not common in populous areas. Several varieties of spruce, fir, and pine occur and shed a tremendous amount of pollen in June and July but it is not felt that they cause trouble.

In the basins and "Parks" grass is an offender The growing season is short, June to early September, and grass sensitive patients from the plains may experience a mild flare up by visiting these areas any time in the summer.

Ragweeds, including burweed marsh elder and Kochia, are found growing up to 8,000 feet and at this altitude they are sparse and stunted. They would cause little difficulty above 6,500 feet. Ragweeds, except burweed marsh elder, are not common on the Western Slope. The most common weeds on the Western Slope are sagebrush, Kochia, Russian thistle and burweed marsh elder All except sage are confined to the valleys. Sagebrush grows extensively over the entire area up to

9,000 feet but at these higher altitudes the plants are small. In the valleys of the Western Slope are numerous fruit orchards and though the pollen from these do not cause trouble, some people have difficulty from the insect sprays which are used.

Airborne Mold Spores. The spores of *Alternaria*, *Hormodendrum*, *Helminthosporium*, and the smuts are numerous in the plains area where wheat and other grains are grown. Though the total counts may not be so high as in the midwest, it must be kept in mind that people who work in the harvest are exposed to very heavy amounts and respiratory allergies to these are almost as common as pollen cases These may cause symptoms in the mountain parks where hay is cut, dried, and stacked. The mold season extends from June through October and many patients have symptoms well into the fall.

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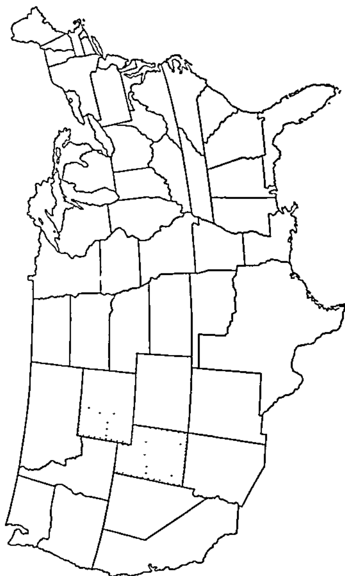
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29

Utah and Western Wyoming

By Dean A. Moffat, M.D., and
George A. Peck, M.D.

TOPOGRAPHY. Utah and Western Wyoming are areas of a high plateau of 4,000 to 6,000 feet elevation. Mountain ranges from 8,000 to 10,000 feet with peaks of 13,000 feet divide the plateau into many irregular-sized and shaped valleys. The central topographical feature of Utah is the Wasatch Mountains which enter the State near the middle of the northern boundary and trend southward almost across the state. The Uinta Mountains course eastward from the Wasatch Mountains dividing Utah from Wyoming There are shorter mountain ranges running north and south on both sides of the Wasatch Mountains. The Rocky Mountain range joins the Utah-Wyoming corner and runs northward dividing Wyoming from Idaho. Diagonally northwest by southeast the Wind River Range of mountains courses across Central Wyoming joining the Rocky Mountain Range in Yellowstone Park in the northwest corner of Wyoming.

Great Salt Lake, a salt water lake covering 2,000 square miles in Northcentral Utah, is the remains of Lake Bonneville (now called the Great Basin) that covered Utah and Western Wyoming prehistorically.

Mountain streams that flow to the arid valleys have been reservoired and used for irrigation changing many valleys to fertile irrigated farm areas.

Climate. The climate in general of Western Wyoming and all of Utah is that of a cool desert with extremes of temperatures so that cotton can be grown in the southwest portion of

per refining and steel production being the two largest single developments.

The copper smelter at Garfield, Utah, and the lead smelter at Tooele, Utah, give rise to local air pollutions of sulfur dioxide locally for areas of a five-mile radium of each Salt Lake City has in effect smoke abatement rules because of it being located in a valley surrounded by mountains. Soft coal and natural gas are the sources of fuel, heating homes by central heating plants

Brick and frame homes are used and are constructed in general to withstand high and low temperatures Lower priced homes are usually heated with floor and wall furnaces

Air conditioning is present in most commercial buildings with compressor refrigeration used in the larger units and evaporative or desert coolers used in the smaller units.

Many asthmatics have migrated to this area in relief of their asthma, especially people from the West Coast Area. Relief factors have been variable but of sufficient number that the migration seems to continue

Allergenic Factors. No single major factor is present in this area that is not found in other areas The mountains and canyons do offer retreats for pollen sufferers in that pollination of the plants of the higher elevations are behind the schedule of the valleys and the prevailing winds do not carry the pollen concentrations up the canyons as much as through the valleys.

A second special factor in this area is the prevalence of basements in homes that have proven by many plate type mold surveys to contain considerable amounts of molds including *Aspergillus nigre*, *Penicillium*, *Phoma*, *Botrytis*, etc In general these basements are more humid and cool in summer and are not provided with good circulation of air They are often used as storage places for vegetables, fruits, and materials subject to mold growth The clinical proven sensitivity to these molds has not been high in percentage of cases but rather intense reactors when they are found

The presence of "Smelter Smoke" at Garfield and Tooele, Utah, containing sulfur dioxide has locally clinically proven to

Utah and that only rapid maturing plants can be grown in Northwestern Wyoming. Three-fourths of the population of Utah is concentrated in three valleys in Northcentral Utah, Weber, and Utah valleys, where the average seasonal temperature during the winter is 27.5° F., 47.0° in spring, 68 3° in summer, and 49.1° in autumn. Precipitation is heaviest along the central mountain system and in the north section of Utah. The average annual precipitation in the Great Basin is 14.19 inches as compared to 10.92 inches in Western Wyoming. The rainy season is late winter and spring; the dry season is summer and early fall. Average snow fall is 51 5 inches with the greatest extremes in the northern ranges. The relative humidity varies from 18 to 87% for monthly averages with the highest and lowest occurring in the late afternoon. There is relatively little dew. Fog does occur in the valleys in the north part of Utah in the forenoon for 5-10 days in some November, December, and January periods.

Wind in Western Wyoming is daily in spring, summer, and fall and occasionally produces visible dust storms. In Utah the wind is extremely variable with dust storms rarely occurring.

The climate of Utah and Western Wyoming is directly related to its topographic site, and thus more than 4,000 species of plant life are grown.

Social Structure. The social structure of this area is built around many small communities located at the mouth of canyons where streams furnish the water for drinking and irrigation purposes Social activities within these communities are more numerous than the average. As the Mormon Church originally settled this area the church is the center of activity in the small communities Salt Lake City, Ogden, and Provo, the three largest cities of this area, are the centers of transportation, mining, and marketing Copper, coal, iron ore, gold, zinc, lead, natural gas, and asphalt all are mined There are 1,200,000 acres (3% in Utah) of irrigation farms, and 600,000 acres of dry farming, with 6,500,000 acres of range or grazing land. Livestock and poultry industries are well known.

Manufacturing has increased markedly since 1946 with cop-

per refining and steel production being the two largest single developments.

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TABLE I

POLLEN SURVEY

Salt Lake City, Utah
(April-September)

	April			May			June			July			Aug.			Sept.		
	'49	'50	'51	'49	'50	'51	'49	'50	'51	'49	'50	'51	'49	'50	'51	'49	'50	'51
Alder	79	6	10															
Juniper	57	5	4															
Poplar	612	421	310	27	128	189												
Box elder	1248	628	564	148	44	24												
Birch	6	2		4	16	2												
Willow	22	8	7	4	2	2												
Wingscale	20			51	17	5	79	55	62	46								
Grass				74	21	18	94	110	92	82	63	70	16	10	12	4		2
Greasewood				15			2	4	5									
Scrub oak				75	47	26	20	22	25									
English plantain						5	26	5	18	19	13		4	2				
Ragweed							4		2	14		71	150	120	123	305	26	
Tree of Heaven							4		2		4							
Russian thistle										131	11	89	118	55	92	22	4	25
Kochia										2	2	25	234	90	215	28	32	30
Sugar beet												6	70	40				
Sage									2			14	48	18	22	386	74	287
Composite													2			2		
Pigweed													7	6	8	10	9	5
Pine				7				39			30	10		4	4			2
Miscellaneous	18	2		26	5	7	34	8	10	12	4	5	28	2	4	12	5	8

be a marked irritant to the nasal and chest allergic cases.

The prevailing winds within each of the valleys produces many varied pollen concentrations, such as in Salt Lake Valley the west side of the valley will often have high counts of rag-

TABLE II

POLLEN RECORD FOR ZION NATIONAL PARK, UTAH

	1947	*1948*	*Season*
Juniper	150	7,700	March-May
Maple	68	33	March-May
Poplar	46	210	March-April
Willow	108	99	March-April
Ash	136	94	March-April
Oak	592	682	April-June
Grass	93	74	April-May
Chenopod*	1,047	148	May-September
Ragweed	56	169	March-April, July-September
Sage	98	104	September-October
Composite	33	298	September-October
Miscellaneous	73	101	

* Mostly shadscale (*Atriplex canescens*)

weed with comparatively low counts on the east side of the Valley

Migrations of the cicada fly does occur through Utah, but as yet no cases of sensitivity have been noted.

Each fall about 90,000 deer hunters comb the Utah Mountains and thousands more in Wyoming This usually produces some deer dander sensitivities as well as some local contact allergy

Utah and Western Wyoming are considered to have a higher than average incidence of rheumatic fever. It is the opinion of many doctors of this area that our nose and throat cultures do contain more than average amounts of beta streptococci In general clinical appraisal of sensitivity seems to be greater where these organisms are present No accurate *surveys or* positive proof of these statements have yet been obtained.

The Pollen Problem. Continuous pollen counts have been made in Salt Lake City since 1948 (See Table I). Prior to

TABLE III

POLLEN RECORD FOR BRYCE CANYON NATIONAL PARK, UTAH
1948

	Apr.	*May*	*June*	*July*	*Aug*	*Sept*	*Oct.*	*Total*
Cedar (juniper)	1116	605	22	11	36	11	16	1817
Oak	0	123	60	4	0	0	0	187
Grass	0	10	30	256	12	8	4	320
Plantain	0	0	4	5	0	0	0	9
Miscellaneous chenopods	0	29	12	52	14	8	0	115
Sagebrush	0	14	0	2	86	114	100	316
Composite*	8	4	12	10	198	30	4	266
Ragweed	22	43	11	7	18	43	4	148
Miscellaneous	4	2	14	4	6	8	0	38

* Mostly in clumps.

that time similar surveys had been made only during two widely separated seasons. Spot tests with the pollen whip have been used in some cases to detect and evaluate offenders The tree pollen season starts in March and continues through May with a fairly constant amount of pollen pollution varying with the precipitation, temperature, and wind velocity. Local variation of the concentration and types of tree pollens is great because of the fact that since this area was settled a variety of trees has been planted in the valleys. The native trees of the foothills include box elder, cottonwood, red birch, scrub oak,

TABLE IV

POLLEN RECORD FOR YELLOWSTONE NATIONAL PARK, WYOMING

	Mammoth June-September 1940 and 1944 Average Total	*West Yellowstone (Montana) August, September 1945 Total*
Ragweed	20	24
Grass	402	45
Russian thistle	58	23
Sagebrush	208	28
Composite	6	23
Miscellaneous	30	13

mountain maple (*Acer glabrum*), willow (*Salix exigua*), and alder (*Alnus tenuifolia*). The lower mountain ranges contain mainly mountain red cedar (*Juniperus scopulorum*), Utah cedar, or desert juniper (*J. utahensis*), and one-seeded juniper (*J monosperma*) In the higher mountain ranges grow blue and Engelman spruce, small Douglas fir, and the following pine—ponderosa, lodgepole, limber, and pinyon, all of which are largely if not wholly inactive allergenically.

The Mormon pioneers planted Lombardy poplar and Carolina poplar (cottonwood) for windbreaks More recently almost every variety of tree that will survive in this climate has been tried However, Norway and sugar maple are predominant The principal air-borne tree pollens are shown in the accompanying table The proven clinical offenders are of two types maple, including box elder, and poplar The junipers are potential offenders whose actual role has not yet been determined in this area

TABLE V

POLLEN RECORD FOR GRAND TETON NATIONAL PARK, WYOMING 1948

	July	*August*	*September*	*Total*
Grass	485	31	0	516
Chenopod	4	11	1	16
Red sorrel	47	0	.0	47
Composite	0	2	0	2
Sagebrush	2	29	48	79
Ragweed	10	2	2	14
Miscellaneous	7	0	0	7

The grass season is of moderate intensity clinically The wild or introduced forage grasses of Utah as a rule produce very little pollen, and most of the productive meadow and lawn grasses require irrigation. Thus the acreage of heavily pollinating grasses is strictly limited June grass (*Koeleria cristata*) covers many dry hillsides Other grasses are being introduced for irrigated pastures yearly

During July and August Russian thistle has been considered

the major offender, but during the past two years Mexican burning bush *(Kochia scoparia)*, a closely related plant, has become dominant. Whether all of the reactions to the pollen of this weed are specific or merely cross reactions to Russian thistle, is difficult to determine. The August-September period has always been the most active clinical period for hay fever because of the additional ragweed factors with Russian thistle and Mexican burning bush. The prevalence of pollens of giant ragweed, western ragweed, and false ragweed, together with that of the allied sagebrush, creates a distinct double problem even though air concentrations are low as compared with figures for the Middle States.

Atmospheric Spores. We have not been able to prove atmospheric spores to be a major offender clinically, but they have been noted to be an aggravant to some hay fever cases. *Alternaria* seems to be singly the major offender. Wheat smut has been on the suspect list the past few years as an additional offender, but correlation of testing, symptoms, and the atmospheric content has not been accomplished.

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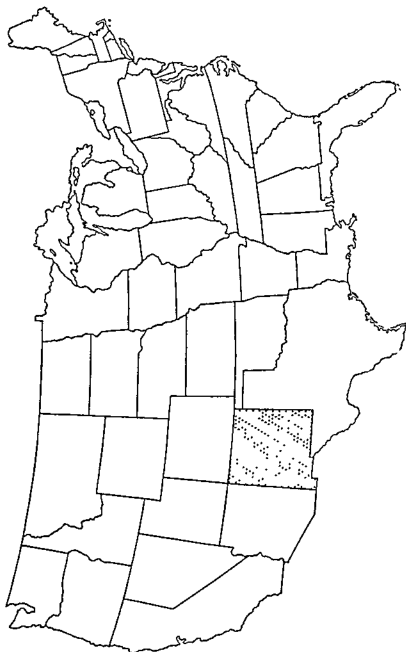
New Mexico

By T. E. Kircher, Jr., M.D.

HERE follows a résumé of the climatic, socio-economic and botanical factors that may serve as a guide for the residence of allergic individuals in New Mexico.

Geography. This State is largely a high plateau gently sloping southward, bisected from north to south by the mountainous backbone which constitutes the State's vacation-land. Vast expanses of arid, sparsely populated, high desert country are government owned Indian Reservation land, chiefly in the northwest and ranching lands in the eastern section. The Rio Grande River paralleling the state's rocky vertebral column furnishes a narrow strip of irrigated farming land. The Northcentral Area is mountainous rugged country with clear cold river systems which furnish fishing, camping and guest ranch recreational facilities to attract the summer vacationist. Santa Fe and Taos are centers, jumping-off places for the pollen-sufferer. The windy high plateau which constitutes the western section of the State is largely the home of the nomadic Navajo and the sedentary Pueblo Indian. Students of anthropology and archaeology are attracted to these vast expanses which offer little livelihood to other than the most hardy, pioneer-type immigrant The eastern section is arid grazing land with horizon-stretching cattle ranches New Mexico, fourth in area, has a population of less than 700,000, one-sixth of which is found in greater Albuquerque, the commercial, economic and geographic center of the State.

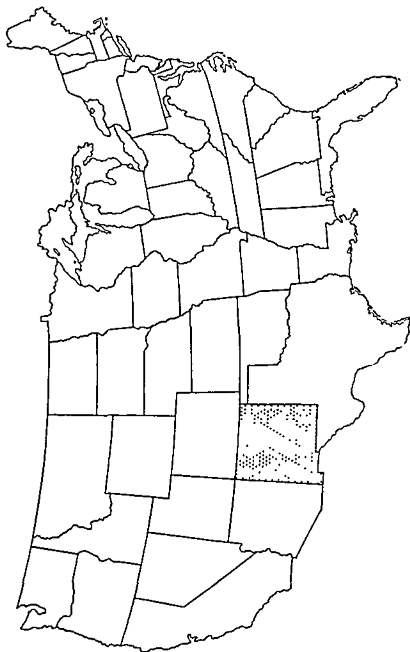
Climate. The climate is typical of a high arid plateau With an average rainfall of 10 inches per year except in the higher mountain ranges of the northcentral regions where snow dots the peaks perennially, there is neither fog nor periods of high



humidity. Daily temperature swings of 35° to 40° during much of the year are common in the more populous areas and make for sparkling clear winter nights, but also cause hot dry summer days The "rainy season" is the latter half of July and the first half of August In New Mexico the green rainy spring months of the Midwest and Eastern United States are replaced with gusty dry winds which the new-comer finds an endless trial to his patience. Winters bring short-lived blizzards which temporarily interrupt mountain travel, permit skiing at the higher elevations while the sun baked valleys seldom see the sleet covered streets and the slushy snows encountered in the Midwest or Eastern United States.

The absence of industrial areas, the extremely low humidity, and the constant breezes found at our high elevation (average state altitude 5,700 feet), preclude the formation of smog or industrial smokes With the state's extensive natural gas supplies piped to urban centers there is no residential coal smoke problem.

Social Structure. The State's gain in population of 28% over the past 10 years reflects a migratory trend, half of this gain is in the county surrounding Albuquerque which is the economic and educational center of the State Whereas in the past years the State's meager influx has been composed of health-seekers, afflicted with arthritis and chronic respiratory disease, the recent boom in census and contingent building figures is largely due to the development of a "nuclear fission industry" under the Atomic Energy Commission at Albuquerque and Los Alamos, the secretive Shangri-La at the higher plateaus 100 miles to the northwest This has attracted much technical and professional personnel of high calibre and has added new blood to an otherwise easy-going population composed of (i) the lethargic but colorful Latin American forerunner who cultivates marginal lands and (ii) the sun-baked cattle or sheep rancher who prefers his windy, open spaces to the urban centers The southern portion of the State devotes itself to metal mining in the west and an increasingly valuable agricultural trend with cotton the staple crop in the south and east



will seriously limit his physical exertion and certainly increase his dyspnea.

The Pollen Picture. The migrant from the midwest or eastern section of the United States is usually blissfully elated at escaping the grasses and ragweed pollens of his home states. He is presented with new trees, little grass and new weeds. As would be expected in the allergic individual, several seasons of exposure, commonly three or four, to new pollens, will produce in many, not all, a sensitivity to the stranger allergens in their new environment and an eventual return of their symptoms He should be fore-warned that his allergies may "catch up with him in time." This is especially true with the hay-fever victim.

It is difficult to portray the State's pollen picture in a graphic form at what blooms when and where Four factors determine it—water supply, altitude, latitude and temperature. The first two often permit the native sneezer or wheezer to completely escape an offending pollen in an hour or two drive to a mountain retreat The latitudes and lower winter temperatures of the State south from Albuquerque permit Bermuda grass to assume an increasingly important role as a major summer time offender. To date it has not invaded to the north where in turn sagebrush is of major importance in late summer and autumn.

As mentioned above, every month but December finds some hay fever sufferers Consequently, the trees, the grasses and then the weeds will plague some allergics and the reader is assured that total pollen counts are not a criterion to severity of symptoms.

Trees. Spotty pollination of mountain cedar (Juniperus monosperma) ushers in the year with its peak in March. It inhabits the dry rocky slopes of the lower mesas and mountains of the central and northwestern areas Chinese elm pollinates to enormous atmospheric levels in all urban communities but for a relatively short two to four weeks in February to March Cottonwood, both the mountain and valley (Fremonts) bloom a month later and are found chiefly along irri-

The cultural-minded has for years found centers for artists in Taos, Santa Fe and Albuquerque, while ethnologists, anthropologists and archaeologists are attracted to the northwestern quarter of the State where the Navajo and Pueblo Indians furnish a rich cultural past for study, Gallup for the former, Santa Fe for the latter.

The heating of homes is largely by gas with either the open floor-furnace type which heats by convection, thus circulating house-dust to the discredit of some asthmatics, or by the more popular and more efficient filtered-forced air furnace, which is much preferred by the dust-sensitive individual. Air conditioning for summer comfort is still largely confined to office buildings.

Allergic Factors Special to This Region. With a climate permitting ventilation of homes by dry warm air throughout much of the calendar-year, house-dust, wool and other inhalant allergens assume a less important role in the production of allergic disease. The same is true of air-borne fungus spores, except in localized areas easily avoided by the home-seeker. Children spend more time in outdoor recreation and sports. The majority of sufferers of chronic respiratory infection find the sunshine, low humidity and temperate climate beneficial. The dusty spring winds mentioned previously carry little organic material and few pollens, and are thus tolerated surprisingly well by the asthmatic with extrinsic allergies. Conversely, however, there is greater exposure to pollens, which are found of clinical importance each month but December. Two types of *patients requiring careful medical guidance and* lengthy acclimatization to the State's low humidity are (i) the atrophic rhinitis, the chronic user of nose drops, or aerosolized vaso-constrictors, who finds himself "breathing through a hot stove pipe," and (ii) the catarrhal bronchitis with a hyperactive cough reflex A final note of caution and in fact discouragement is given to the markedly emphysematous individual with cor pulmonale and resultant low respiratory reserve—except for the southern regions of the State, the altitude

ern portion of the State. The victim of giant, dwarf or southern ragweed pollinosis will find a welcome haven in the State. The false ragweed *(Franseria)* grows sparsely and in a patchy manner and is not the problem to the ragweed sufferer that it is in Arizona.

The sagebrush family, chiefly in the form of *Artemesia tridentata*, carpets miles of the high plateaus of the northwestern section of the State. In spite of tremendous pollination, the natives seem to develop little allergy to it. It blooms in September through October.

Molds clinically are of minor importance in New Mexico. A low humidity discourages musty basements or out-houses and irrigated lands are too sandy to permit pooling of stagnant waters.

CONCLUSION

The dry climate and overall high altitude of New Mexico is well tolerated and usually beneficial to the sufferer of chronic respiratory disease provided emphysema (cor pulmonale) is not too advanced. The timothy and ragweed-sensitive individual finds welcome relief in the more populous areas He should, however, be warned, that following three to five years' residency in the state he may develop equally severe symptoms to local pollens, chiefly Bermuda grass and Russian thistle The following list of pollens represents a minimum guide for skin testing prior to migration:

Trees	*Grasses*	*Weeds*
Chinese elm	Bermuda	Russian thistle
Mountain cedar	Johnson	Kochia
(Juniper)		Careless weed
Western cottonwood		False ragweed
		(Franseria)
		Sagebrush

gated valleys and the Rio Grande water shed. A popular fallacy would incriminate cottonwood "cotton" which flies through the air in June and July to vex the housewife. It represents the seeding not the pollination of the tree and invades the air concurrently with Bermuda grass pollen.

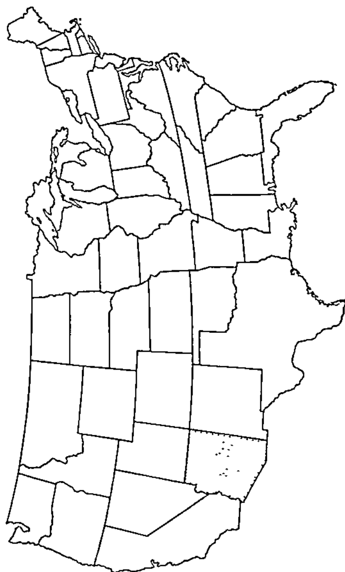
Grasses. The greatest problem is with Bermuda grass found cultivated in Albuquerque and southward, to plague the allergic from April to August. Fortunately, its sensitivity is specific and inherently does not bother the timothy-blue grass sensitive victim. With a low rainfall, natural meadows of dense bluegrass and allied forage are unknown. The sparse range grasses, the fescues and gramas are of minor importance, and timothy is unknown in the State. Bluegass *(Poa)* occurs only as lawns which are pampered with sprinkler and mower, and infrequently grows to pollinating height. Johnson grass *(Holcus halipensis)* pollen is a contributing allergen in the southern irrigated farmlands.

Weeds. The tumbleweed twins, Russian thistle *(Salsola pestifer)* and firebush *(Kochia scoparia)* not only grow profusely throughout the state to an altitude of 8,000 feet, but together contribute the most allergenic of all pollens. The latter, once an ornamental shrub has now become a widespread weed, requiring little moisture and seeking a more southern latitude than Russian thistle Both bloom from June to September and present a problem paralleling the ragweeds of the middlewest and Eastern United States. The magnitude of localized pollen counts is not an index to their clinical significance. Cross reactions in skin testing to the two are common.

The Amaranths, represented by careless weed *(A palmeri)* and pigweed *(A. retroflexus)* are the second most noxious weeds, but limit their growth to irrigated areas Their season coincides with the tumbleweeds, a closely related genus.

The saltbush *(Atriplex)* is not a factor in the major portion of the State (see Dutton's report on El Paso).

On the favorable side of the balance is the absence of the true ragweeds *(Ambrosiae)* except for the extreme northeast-



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Arizona

By E. W. Phillips, M.D.

THIS article presents briefly the principal factors which a physician unacquainted with the region might consider in advising allergic patients concerning climatic therapy in Arizona.

The Geography of this State is best seen from the air. The *irrigated valleys*, each with its central city and satellite towns, appear as green checkerboards of cultivation. Altogether they comprise a scant million acres. They look small in comparison with the brown dry deserts which surround them. Breaking the contour of the flatlands are chains of hills and mountains, bare in the lower altitudes, brushy or forested with evergreens higher up. The slender lakes of stored water, the scant water courses, the pumping stations and straight canals tell the story. Where water can be had there are cities, towns and ranches; there agriculture flourishes. There also the population is concentrated.

The Climate of the irrigated valleys is that of the desert from which they were reclaimed, modified a little by man's intervention These valleys vary in altitude, 1,000 to 2,000 feet, more or less. The mean normal temperature is about 51° in winter and 90° in summer, the relative humidity is low, less than 30% after mid-day, there is little dew and less rain—but from such average figures it is difficult to visualize what the climate really is like The sun shines nearly every day, in mid winter there are frosts; in the other months it is warm and in summer the days are very hot, with almost no humidity toward evening. In August, if there are showers, the nights are hot too. With the rapid growth and industrialization of the larger cities has come a certain amount of smoke and dust in

allergic state. To this statement there are two notable exceptions those whose sinus infections have been treated by excision of the turbinates or other intranasal mutilation, and chronic asthmatics with bronchial deformity and thick viscid sputum In both instances drainage is liable to be impaired.

In Relation to Pollen Incidence it is emphasized that in this region the time and the extent of pollination are influenced by the temperature and the water supply. The plants are opportunists, and their season varies from place to place and from year to year. This being understood, here is an approximate schedule for the Irrigated Valleys: About the first of February the male cottonwoods begin their three weeks of pollination, and as they taper off the male ash trees take over for a like period Then cypress and arbor vitae make a minor contribution Olive trees come on in April and their pollen causes trouble. Chinese elms and male mulberry trees are of no more than neighborhood significance Bermuda grass, imported for summer lawns, has gone wild and has become the common tenant of the roadsides and pastures. Its fine buoyant pollen is scant in March, profuse in April, and present until killing frost in December Its sensitivity is specific, it does not cross-react with eastern grass pollens and it does not affect newcomers The second important grass is Johnson grass, a primitive sorghum It begins in May, does best in mid summer and quits at the first frost The other local grasses, such as wild oat, foxtail, perennial rye and the like, are not allergenically significant

False Ragweeds. These are abundant in the deserts around the valleys, they are not weeds but bushes, not *Ambrosias* but *Franserias* Locally and incorrectly they are called sagebrush, not rabbit bush as the books say *Franseria deltoides* is the commonest, *F Dumosa* has a spotty distribution, *F. ambrosioides* keeps to the less parched places All these bushes pollinate inconspicuously any time after the first of March They release considerable pollen As a rule a person who reacts to one reacts to all three, and also to eastern ragweed Newcomers with group sensitivity to ragweed pollens may be affected

the business districts, but there is no "smog" such as afflicts the coastal communities. The air is too dry for that.

In the *hill and mountain country* there are small cities and scattered towns, but relatively little cultivation. Climate here is a function of altitude. the higher the colder, the windier and in a good year the wetter, but still mostly sunny and dry. At 4,500 feet and up there is occasional snow in winter The summer climate approaches the ideal and the mountain air is clean, except of course in smelter towns

Social Structure. Formerly there was a noticeable proportion of people who came for their health and remained to work Now this element is far outnumbered by those who came because of favorable living conditions and available jobs. Churches are numerous, schools are good, and there is no longer a shortage of doctors. As in any expanding community, housing is alternately behind demand, and ahead of it. Most houses are designed as much to keep cool as to keep warm and dry, doors and windows are open two-thirds of the year. Low-rental quarters are likely to be warmed in winter by unvented gas heaters which are especially noxious to asthmatics. In hot weather some sort of air cooling is needed and evaporative coolers are commonly used These devices draw air through pads of wet excelsior and force it into living spaces. Some asthmatics claim that they "can't stand" this damp cool air, which may have a musty odor. Investigation has not shown any relationship between such intolerance and molds growing on the excelsior mats Actually the mats, if renewed at proper intervals, filter out much of the dust and pollen from the incoming air.

Among Allergenic Factors Special to this Region is the lessened importance of house dust, except to children kept indoors in winter. Much time is spent out of doors or in houses almost as open as a porch For the same reason exposure to outdoor allergens is increased. The wide diurnal variation of temperature is tonic, except to the thermosensitive. The sunshine and dry air are generally helpful to patients with infection of the respiratory tract complicating or underlying the

allergic state. To this statement there are two notable exceptions: those whose sinus infections have been treated by excision of the turbinates or other intranasal mutilation, and chronic asthmatics with bronchial deformity and thick viscid sputum In both instances drainage is liable to be impaired.

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on first exposure to these Arizona composites. For residents and for group-sensitive visitors, then, the first ragweed season comes in early spring. The second ragweed season in the valleys begins in September and lasts about six weeks. It is caused by *Franseria tenuifolia*, the slender false ragweed, and it is relatively mild. This plant grows in watered areas, and is not widespread.

The chenopods have wide distribution and a long season, from March to frost, but their main incidence is in summer. Of the many species present only two are important. Careless weed, resembling pigweed but bigger, grows rank in hot weather, and in fall it invades the citrus groves like a cover crop. Russian thistle, relatively a new invader, has spread widely. It has a long season, from May to cold weather, and a steady pollen output.

From the foregoing it will be seen that in the irrigated valleys the seasons of the different plants overlap The airborne pollen density never approaches the ragweed counts of the middle west, but pollen is in the air at least nine months of the year. Multiple sensitization is usual, and its manifestations require specific treatment, either co-seasonal or perennial. Both methods give good results and if continued successfully for a few years they confer in many cases a permanent relative immunity.

In the *hill and mountain country* the schedule is different. In late winter and early spring the two junipers, *J. pachyphlea* and *J. monosperma* (locally called cedar) cause mild intermittent pollinosis. In May the several species of oaks pollinate. June brings on the Russian thistle and the careless weed *(Amaranthus palmeri)*, both continuing through the summer. In August the western ragweed *(Ambrosia psilostachya)* and the bur ragweed *(Franseria acanthicarpa)* contribute their quota. Thus it is evident that valley residents in their summer cottages, and such out-of-state visitors as happen to be group-sensitive to ragweed are likely to be annoyed.

The saltbushes *(Atriplex spp)* cause some trouble in the drainage area of the Little Colorado, rarely elsewhere. In gen-

eral the pollen ailments of the higher altitudes are rather mild, and they end with the September frosts.

Molds are of minor importance in this dry climate Smuts and rusts are present, affecting chiefly persons who are heavily exposed, as in handling grain, or dry forage in feed mills. One dust of vegetable origin rates special mention. Much cotton is grown and processed in Arizona, and in the fall during the ginning season the gins equipped with exhaust ventilation turn loose a large quantity of finely pulverized cotton seed. Certain persons who are hypersensitive to that dust have to be sent away. In the writer's experience at least, they cannot be desensitized.

In closing, a word about the cottonwood myth When the weather turns hot in early April the filmy seed of the female cottonwood tree flies in the air like snow. A popular belief, hard to eradicate, holds that this visible airborne nuisance is the cause of the hay fever that attacks so many at that time. The cause, of course, is pollen, chiefly the pollen of Bermuda grass. Nevertheless, some doctors dutifully administer cottonwood pollen extract in April, and the civic authorities of two towns decreed the destruction of all female cottonwood trees within the city limits

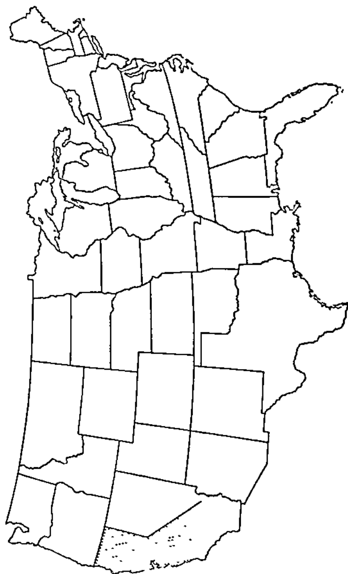
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Northern California

By Albert H. Rowe, M.D.

GEOGRAPHY. Northern California extends from 42° north 480 miles south to 35°, being about 210 miles wide. The Coast Range along the Pacific Ocean varies from 1,500 to 6,000 feet in altitude The Cascades from Oregon extend into Eastern California about 150 miles, from which Mount Shasta rises 14,162 feet and Mount Lassen 10,453 feet. Southward, the Sierra Nevadas extend over 300 miles, finally attaining heights of 12,000 to 14,500 feet. In the mid north the Coast Range and the Cascades join. In the south the Tehachapi Mountains unite the two lateral ranges Thus, there is a coastal area extending from the Pacific to and into the canyons and small and larger valleys of the Coast Range In the center of this area is San Francisco Bay into which the Sacramento River from the north and the San Joaquin River from the south join and empty. On the shores of the Bay are the metropolitan areas—San Francisco by the Golden Gate and the Eastbay of which Oakland is the largest. The Sacramento Valley in the north continues into the longer San Joaquin Valley in the south, forming the great Central Valley, most of which is cultivated. The east slopes of the Cascades and Sierras extend from their crests to the lower desert areas of Nevada.

Climate. Along the coast freezing temperatures are rare, rain being abundant in the north and scanty in the south, with much fog through the spring and summer. Likewise rain is much heavier in the Sacramento than in the Southern San Joaquin Valley. Freezing temperatures may occur throughout the Central Valley, with high temperatures from June to October, especially in the San Joaquin Valley During the winter,



heavy snows cover the eastern mountains, the Northern Coast Range, and at times the Tehachapis. Rivers from the snow on the western slope of the eastern ranges greatly aid irrigation of the great Central Valley. Lesser streams flow down each side of the Coast Range and the eastern slopes of the Cascades and Sierras.

In this area the all important industry is agriculture. Even San Francisco and Oakland depend on this to a great extent although they are the financial, industrial, and cultural centers of Northern California. Most of the other cities and towns depend almost entirely on agriculture, except for Pittsburg, which depends largely on industry, especially steel. The cities and towns on the north coast and through the Sierras depend also upon lumbering and to a lesser extent, mining and fishing.

Pollen. The pollen producing plants of Northern California are listed in varying degrees of importance in Table I. The months of pollination, the degree, frequency, and comments on occurrence of each genus or species are indicated in each of the three arbitrary selected areas. This information was derived from publications of various botanists, through conferences with Professor H. E. McMinn, and through observations of this writer for over a period of 35 years.

In regard to the pollens of major, moderate, and of minor or occasional importance listed in this article, the following considerations are important:

The degree of clinical symptoms does not always depend on the size of skin reactions. Large reactions occur with no existent manifestation of allergy. They arise from potential or past clinical allergy or to non-specific causes. And small or negative reactions are obtained to pollens productive of definite or severe symptoms. In the writer's experience, atopic dermatitis due to pollens especially may occur with negative or slight reactions, especially by the scratch test. The history of seasonal incidence thus, must suggest pollenosis and treatment requires multiple antigens containing the pollens of the area where the symptoms occur. Therefore a list of the pollens of varying importance is obvious.

Allergists or other physicians who accept the challenge of pollinosis should know the frequency of plants listed for the patient's living and working areas. This requires a personal local survey, especially of trees, the number and variety of which varies in every town, city, or farm Thus oak, sycamore, elm, acacia, or other common trees, or such uncommon trees as ash, pecan, chestnut, castor bean or mulberry, may be the patient's special problem Because of the abundance of cultivated flowers and flowering shrubs, especially privet, cotoneaster, and others in most areas of California, a listing of the frequency of them by the patient or by the physician's own survey may be important, particularly when treatment with windborne pollens is unsatisfactory. Flower pollens are of special importance in California where gardens may surround the home, or where acres of flowers may be grown for seeds around the home or working area. And in each region, certain introduced grasses may be grown for lawns in parks or golf courses, or even as crops for food or seeds That pollinosis to grasses may be specific for species rather than for tribes or the family gramineae as a whole is evidenced through clinical results and laboratory experiments The occurrence and frequency of indigenous or widely introduced plants varies for each community. Abundant local plant growth obviously increases the pollen in the air That pollen will blow for many miles and remain in the moving air for days or weeks, of course must be remembered Thus poor results may depend on failure to protect the patient with environmental control or with desensitization to all the allergenic pollens that are in the air of the patient's environments. Willingness and ability to recognize and list all plants from which such pollens arise may be of utmost importance

The pollens of greatest and moderate importance listed for each area require nearly routine study according to the months of the patient's symptoms. The occurrence of pollens of lesser importance will be determined by the physician's or patient's regional survey. In fact, the survey may suggest a maximal influence of pollens of moderate or lesser impor-

tance. The allergic importance of pollens in any area finally must depend on their clinical activity and results of desensitization.

Special comment on the three great local areas of Northern California follows:

COASTAL AREA

There is an increasing abundance of redwood, pine, fir, Oregon ash, tanoak, and alder trees, and of agrostis, timothy, velvet, orchard, and sweet vernal grasses toward the northern, compared with the southern area of this region Interior live oak occurs in the foothills; valley oak is less common than in the Central Valley. The rare occurrence of clinical allergy to pine pollen requires consideration of allergy to other conifers. Coastal sagebrush only occurs in this area, and mugwort is very common except in the extreme north. *Artemisia pycnocephala* grows only in the sand dunes from San Luis Obispo to Eureka. *Franseria bipinnatifida* grows in the sand dunes along the entire coast, and *F. chamissonis* on the central and northern coast. *Atriplex patula* is abundant in the salt marshes and alkaline soils; *Atriplex argenta* and *lentiformis* are infrequent in such areas *Salicornia ambigua* covers the salt marshes. *Scirpus* species are not included since proven cases of *Scirpus* allergy are lacking. This writer at present is studying a patient with asthma who gives positive reactions to *Scirpus* and whose history indicates asthma thereto Proximity to fruit orchards, walnut or olive groves, wheat, oats, or mustard fields, flowering sugar beets, or other cultivated vegetation, as previously discussed, may cause pollen allergy in this as in the following two areas.

CENTRAL VALLEY AND FOOTHILL AREA

As shown in the chart, many varieties of trees grow in this area. Native oaks, walnuts, and sycamores are scattered over the plain of the valley, they, along with alders and conifers, are in the canyons and on the slopes of the lateral mountains, while great conifer forests occur in the upper areas. The shade

trees in the cities and towns usually are abundant and large; although elm, sycamore, and black walnut predominate, the physician must make or have a local survey to determine the frequency of common and uncommon trees in each community. The extensive cultivation of walnuts, olives, and other fruit trees yields local problems.

In this area, the ray and bermuda grasses are of superlative importance, the brome, oat, blue, and wild rye grasses being of moderate importance. Johnson and salt grasses need local consideration Redtop, timothy, velvet, and orchard grasses occur in lawns and parks and are cultivated for pasture in the mountains Extensive plantings of wheat, oats, corn, alfalfa, clover, and of the scanty pollinating barley occur. Allergy to alfalfa is common Rice is largely grown in flooded lands of the Sacramento Valley. Being self-pollinated, it seems of no clinical importance The increasing cultivation of cotton and potatoes in the San Joaquin Valley is responsible for dust storms similar to the peat dust storms from the cultivated islands in the river delta, which invade Stockton, Lodi, and adjacent areas The presence of spores of fungi in these dusts is discussed below.

The important weeds are listed in the chart. According to their frequency, the less important *Amaranthus*, *Atriplex*, and *Chenopodium* pollens may require therapy *Atriplex polycarpa* occurs only in the San Joaquin Valley *Franseria acanthicarpa* is the only false ragweed, and western ragweed is abundant in many areas throughout the Central Valley Mugwort is *the* important *Artemesia*. Coastal sagebrush is absent. Those weeds growing in the alkaline areas assume a regional challenge.

EASTERN CASCADE AND SIERRA AREAS

Cottonwood, willow, elm, locust, birch, and in the north, ash trees are local problems The frequency of native *aspen*, box-elder, and conifers requires recognition of possible rare allergy thereto The grasses of marked and moderate importance are charted, the physician through local surveys must determine their relative frequency and through the results of

tance. The allergic importance of pollens in any area finally must depend on their clinical activity and results of desensitization.

Special comment on the three great local areas of Northern California follows:

COASTAL AREA

There is an increasing abundance of redwood, pine, fir, Oregon ash, tanoak, and alder trees, and of agrostis, timothy, velvet, orchard, and sweet vernal grasses toward the northern, compared with the southern area of this region. Interior live oak occurs in the foothills, valley oak is less common than in the Central Valley. The rare occurrence of clinical allergy to pine pollen requires consideration of allergy to other conifers. Coastal sagebrush only occurs in this area, and mugwort is very common except in the extreme north *Artemisia pycnocephala* grows only in the sand dunes from San Luis Obispo to Eureka. *Franseria bipinnatifida* grows in the sand dunes along the entire coast, and *F. chammisonis* on the central and northern coast. *Atriplex patula* is abundant in the salt marshes and alkaline soils, *Atriplex argenta* and *lentiformis* are infrequent in such areas *Salicornia ambigua* covers the salt marshes. *Scirpus* species are not included since proven cases of *Scirpus* allergy are lacking. This writer at present is studying a patient with asthma who gives positive reactions to *Scirpus* and whose history indicates asthma thereto. Proximity to fruit orchards, walnut or olive groves, wheat, oats, or mustard fields, flowering sugar beets, or other cultivated vegetation, as previously discussed, may cause pollen allergy in this as in the following two areas.

CENTRAL VALLEY AND FOOTHILL AREA

As shown in the chart, many varieties of trees grow in this area. Native oaks, walnuts, and sycamores are scattered over the plain of the valley, they, along with alders and conifers, are in the canyons and on the slopes of the lateral mountains, while great conifer forests occur in the upper areas The shade

	Pollinating Months (Incl)	Coastal Area	Central Valley	East Sierra
		1. Scarce, 2 Common, 3. Abundant		
Pyrus sps. (pear, apple)	2-4	1	1	1
Roses	1-12	1	1	1
Salicaceae				
Populus sps (aspen, cotton-wood, poplar	3-4	3	3	3
Willow	2-4	1	1	1
Ulmaceae				
Chinese elm	7-9	3	3	3
Elm	2-3	3	3	3
Grasses				
Agrostideae				
Agrostis sps (red top, bent-grass)	4-9	3	3	3
Beach grass	4-8	1		
Sweet vernal grass	5-7	1		
Phleum sps (timothy)	4-8	2	2	2
Andropogoneae				
Johnson grass	5-9	1	2	
Sudan grass	6-8	1	2	
Aveneae				
Oats	3-6	3	3	3
Velvet grass	4-9	3	2	2
Chlorideae				
Bermuda grass	1-12	3	3	2
Cord grass	4-6	1		
Festuceae				
Brome sps	4-6	3	2	1
Orchard grass	4-9	3	2	2
Salt grass	4-8	2	3	2
Fescue grass	4-7	2	2	2
Walk grass	1-12	2	2	2
Bluegrass	3-7	1	1	1
Hordeae				
Elymus sps	4-8	2	2	2
Barley	4-6	1	1	
Lolium sps (ray grass)	4-8	3	3	2
Rye	4-6		2	2
Wheat	3-6	2	2	2
Paniceae				
Crabgrass	5-10	1	1	1
Barnyard grass	6-9	2	2	
Tripsaceae				
Corn	5-8	2	2	2
Weeds, Herbs and Shrubs				
Amaranthaceae				
Green amaranth	5-9	2	2	2
Rough pigweed	5-10	3	3	2
Chenopodiaceae				
Silverscale	5-9	1	1	1

TABLE I

BOTANICAL SURVEY OF NORTHERN CALIFORNIA

Albert H. Rowe, M D.

	Pollinating Months (Incl) 1 to 12	Coastal Area	Central Valley	East Sierra
		1. Scarce, 2 Common, 3. Abundant		
Trees				
Aceraceae				
Maple	1-3	2	2	
Box elder	2-4	2	2	2
Anacardiaceae				
California pepper	6-8	2	2	
Betulaceae				
Alnus sps.—alder	3-6	3	2	3
Birch	2-5	3	3	3
Fagaceae				
Chestnut	5-8	1	1	1
Coast live oak	2-5	3	2	
Valley oak	3-4	3	3	
Interior live oak	3-4	3	3	
Gualandaceae				
Pecan	4-5	1	1	
Black walnut	4-6	3	3	
English walnut	3-5	2	2	1
Leguminosae				
Acacia	1-12	2	2	
Locust	4-6	1	1	1
Morceae				
Hops	5-6	1	1	2

Cypressaceae, Palmaceae, Taxodiaceae, Phalarideae, Heliantheae, Artereae, and species of families included in the chart such as various oaks, spruce, hemlock, Tree of Heaven, grasses, atriplexes, and other species which are infrequent or questionable causes of clinical allergy are not listed. The common and not the botannical names of the listed pollens are used to conserve space. All this data is included in the writer's recent publication (9)

Oleaceae				
Ash	3-6	2	2	2
Privet	4-7	2	2	1
Olive	4-6	3	3	
Pinaceae				
Cedar	8-10	1	1	1
Pine	1-12	2	2	2
Plantanceae				
Western sycamore	3-4	2	2	
Rosaceae				
Prunus sps (peach, apricot, almond, cerry, prune, plum)	2-5	1	1	1

elevation and moisture. Thus sagebrush is absent in large dry areas This again requires acquaintance with the local flora, although the blowing of pollens even for extreme distances must be realized.

Molds. Mold allergy is of minor importance to pollen allergy in Northern California. *Hormodendrum* is most frequent in the coastal area, with *Penicillin*, *Sporotrichum*, *Alternaria*, *Aspergillus*, and other fungi in lesser numbers. *Alternaria* and smuts are more frequent in the grain raising areas of the Central Valley Allergy to molds is important to consider, especially when living environments are damp as in the north coastal area or in damp homes or working environments in other areas. Spores of fungi in the peat dust in the Stockton Area have been under suspicion but results from treatment with extracts from cultures of such fungi have been disappointing.

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9 ROWE, ALBERT H Botanical Survey of Northern California, *Annals of Allergy*, Vol 10, Pages 605-614, September-October, 1952
10 WODEHOUSE, R P *Hay Fever Plants* Waltham, Mass, *Chronica Botanica*, 1945

TABLE I *(Continued)*

	Pollinating Months (Incl.) 1 to 12	*Coastal Area*	*Central Valley*	*East Sierra*
		1 Scarce, 2. Common, 3. Abundant		
Lenscale	6-8	2	2	
Spearscale	6-10	2	3	
Wingscale				
Allscale	7-8		3	
Redscale	6-9	2	2	2
Bassia	6-9		2	2
Lamb's quarters	4-9	3	3	2
Mexican tea	6-9	2	2	
Wormseed	4-11	2	2	
Pickleweed	6-9	3	2	2
Black greasewood	5-8			3
Ambrosieae				
Western ragweed	7-11	1	3	2
Franseria acanthicarpa	6-10		3	
Franseria bipinnatifida	5-10	3		
Franseria chammissonis	5-10	2		
Franseria dumosa	3-8			2
Poverty weed	7-9	1	1	2
Cruciferae				
Wild mustard	2-5	1	1	1
Leguminosae				
Alfalfa	4-10	1	1	1
Sweet clover	4-8	1	1	1
Plantiginaceae				
Plantain	4-7	2	2	2
Polygonaceae				
Sheep sorrel	3-9	3	3	2
Dock	3-7	2	2	2
Anthemideae				
Coastal sagebrush	7-10	3		
Mountain sage				3
Field sagewort	6-9	3		
Mugwort	7-10	3	3	2
Euphorbiaceae				
Castorbean	4-11	1	1	1
Cultivated Flowers				
Asters, chrysanthemums, daisies, dahlias, sunflowers, etc.	1-12	1	1	1

treatment, the frequency of allergy thereto. Mountain sagebrush, western ragweed, Russian thistle, and greasewood increase along with other charted weeds with descent into the desert adjacent to Nevada. All these weeds vary according to

elevation and moisture. Thus sagebrush is absent in large dry areas. This again requires acquaintance with the local flora, although the blowing of pollens even for extreme distances must be realized.

Molds. Mold allergy is of minor importance to pollen allergy in Northern California. *Hormodendrum* is most frequent in the coastal area, with *Penicillin*, *Sporotrichum*, *Alternaria*, *Aspergillus*, and other fungi in lesser numbers. *Alternaria* and smuts are more frequent in the grain raising areas of the Central Valley. Allergy to molds is important to consider, especially when living environments are damp as in the north coastal area or in damp homes or working environments in other areas. Spores of fungi in the peat dust in the Stockton Area have been under suspicion but results from treatment with extracts from cultures of such fungi have been disappointing.

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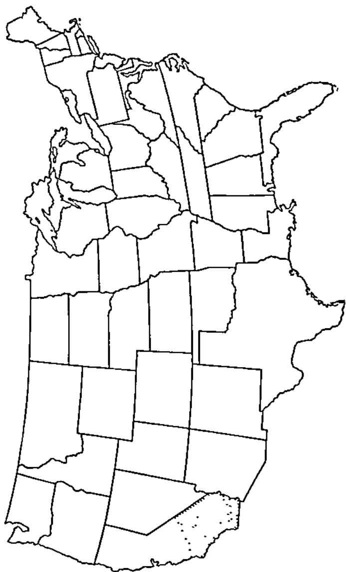
Southern California

By George Piness, M.D.

THERE is little to add to the survey made of S
California in 1926 by Piness, Miller, and McMin
the exception of some minor observations made by
Targow,[3] and Small[4] in certain isolated areas.

A botanical survey is an essential requisite for int
diagnosis and treatment of hay fever and bronchial
whose etiology is based on pollen sensitivity.

The objectives of the survey were. (1) The identific
the plants which are wind pollinated in specific dist
order to ascertain the proper correlation between skin re
and the pollen to which the patient may be exposed
record of the pollinating season (onset and terminating
so that treatment may be properly planned (3) Infor
as to the relative abundance, size, duration and varia
the pollinating season, in order that pollens of relativel
importance may not be given too great weight The fi
teria for determining the importance of any particular
for therapy are the patient's history relative to seaso
area in which he resides, and a correlation of the skin re
to the pollen to which he might be exposed. The sur
Southern California was made to obtain the informatio
lined above. This survey consists of data collected o
eight-year period, during which time extensive polle
lecting and survey trips were made, in addition to s
made to identify the specimens of plants collected o
above mentioned trips by the the of the herbaria of Pomon
lege at Claremont and The University of California at
ley. These data include observations on the geographi



Geography. The area surveyed known as Southern California is that portion of California lying south of the Tehachapi Mountains It includes eight counties, namely, Santa Barbara, Ventura, Los Angeles, Orange, San Diego, Imperial, Riverside, and San Barnardino. It lies between 32°35' and 35° north latitude and between the 114th and 119th meridians. Its west-

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Fig. 1. Distribution Map—Museum of Vertebrate Zoology, University of California



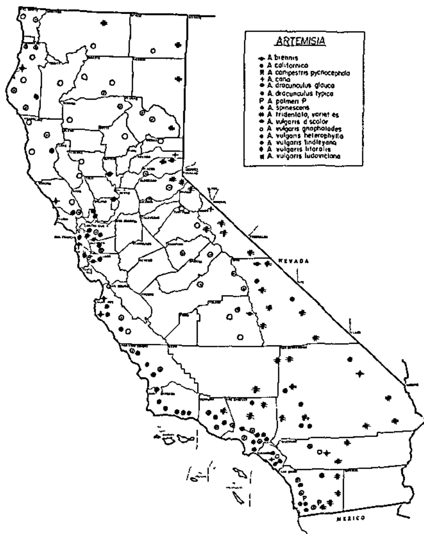
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Fig 2 Distribution Map—Museum of Vertebrate Zoology, University of California

ern boundary is the Pacific Ocean, its southern, Lower California, its eastern, the Colorado River, which separates it from Arizona, and its northern, a series of crossing mountain ranges extending from the Sierra Nevada to the Coast Ranges.

The topography of the region is very irregular, broken by

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There is also a great range in temperature. One may stand in Los Angeles or Pasadena in January with the thermometer registering 60° and witness a snow storm in the mountains. Stations on the desert in July and August register as high as 115°.

Pollen. In a region like this, where the topography is so varied and the climate likewise so diverse, it is not surprising that there are about 350 species of native or naturalized plants in this area that are wind pollinated. For the sake of convenience, the species have been grouped under three divisions, these agreeing to some extent with the season of flowering. The first of these is comprised of the spring pollinated trees and shrubs, the second of the grasses, sedges, and rushes, and the third of the weeds. In the first group are 63 native species comprised of pines, incense cedars, spruce, junipers, cypress, ephedra, and willows, none of which are of any great importance since they have rarely been known to cause symptoms through clinical observation nor have they produced positive skin reaction However, walnuts, sycamore, maple, ash, hackberry, olive and Chinese elm may be factors in the spring and early summer because of their use as ornamental and street trees.

The second group is made up of about 120 species of grasses and 50 species of sedges and rushes None of the latter have produced positive skin reactions or produced clinical symptoms of hay fever or asthma and are, therefore, not included in the survey. The 120 species of grasses represent 53 genera, but many of the species are of such local and scattered distribution, or yield so little pollen, that they cannot, from a botanical viewpoint, be considered important factors in causing hay fever. The most important grasses, based on abundance, general distribution, and amount of pollen produced, are Bermuda grass *(Cynodon dactylon)*, Brome grass *(Bromus)*, Johnson grass *(Holcus halepensis)*, Ray or Rye grasses *(Lolium)*, Blue grass *(Poa)*, Canary grass *(Phalaris)*, Wild rye grass *(Elymus)*, Koeleria grass *(Koeleria)*, Wild oats *(Avena)*, Fescue *(Festuca)* and others of less importance.

The third group contains some of the most important hay fever plants This is due to the abundance of the plants, their

many mountain ranges and separated by narrow passes or valleys of various sizes. The eastern part of the region is comprised of arid desert wastes east of the San Bernardino and San Jacinto Mountains; they consist for the most part of the Mojave and Colorado Deserts separated by the Cottonwood and Chuckawalla Mountains. The western portion of the region is made up of the San Rafael, Santa Inez-Santa Monica, Santa Ana, Palomar, Cuyamaca, San Gabriel, San Jacinto and San Bernardino Mountains and the intervening valleys. There in a general way extend parallel to the coast line. The costal ranges rise from sea level or valley bottoms to altitudes of 4,000 feet. Some of the mountains of the central range reach altitudes of over 10,000 feet.

Many of the valleys of the western or coastal side of the mountains and foothills are very fertile and when water is abundant support a luxuriant vegetation. Several, however, are interspersed with low alkaline flats, gravelly mesas and washes. The valleys on the eastern slope are usually much drier, and the flora for the most part is of the desert type. The coastal region in several places consists of extensive alkaline marshes which support a saline type of vegetation.

Climate. The climate of Southern California is quite diversified as a general rule, relatively scant rainfall and high temperature are characteristic. These features become more pronounced toward the central and eastern sections of the regions which are not reached by the cooling effect of the ocean breezes Since the mountain ranges lie parallel to the coast line, their axes extend generally at right angles to the direction of the prevailing storm winds As a result it is on these ranges, mainly during the winter and spring months, that the greatest rainfall in this region occurs The average annual rainfall for the coastal and mountain regions ranges from 10 (San Diego) to 30 inches (Cuyamaca) while some of the desert slopes and flats receive as little as two inches annually. During summer and fall there is almost perpetual sunshine, and during these seasons there is very little chance that rains will clear the atmosphere of the windblown pollens, as is so frequently the case in districts east of the Rocky Mountains.

GROUP II GRASSES

Achyrodes aureum	Golden Top	1 1111 1	1	1	1		1	1
*Agrostis palustris	Red Top	1 1111 1111 1111	1	1	1		1	1
Agrostis verticillata	Water Bentgrass	11 1111 1111	1	1	1		1	1
Avena barbata	Barbed Oats	1111 11	4	4	5		4	4
*Avena fatua	Wild Oats	1111 1111 1	7	7	5	.	6	6
*Bromus carinatus	California Brome-grass	1111 1111	4	4	4		2	2
*Bromus hordeaceus	Soft Cheat	1 1111 111	3	3	3		4	2
Bromus marginatus	Large Mountain Brome-grass	111 1111 1	3	2	2	.	1	1
Bromus laevipes	Woodland Brome-grass	1 1111 1111	4	4	2		1	1
Bromus rigidus	Broncho Grass	111 1111 11	7	7	6	1	5	5
Bromus rubens	Fox-tail Brome-grass	1 1111 1111 11	5	5	4	1	4	4
*Capriola dactylon	Bermuda Grass	111 1111 1111 1111 1111 1111 1111 1	10	10	9	10	9	9
*Dactylis glomerata	Orchard Grass	11 1111 1111 1111 1111 1111 1111 1	1	1	1	..	1	1
*Distichlis spicata	Salt Grass	11 1111 1111 1111 1111	5	5	6	3	3	4
Echinochloa crusgalli	Barnyard Grass	1111 1111 1111 1111 1	2	2	2	2	2	2
*Elymus condensatus	Giant Rye-grass	11 1111 1111 11	4	3	3		4	4
*Elymus glaucus	Western Rye-grass	11 1111 11	1	1	1	..	2	2
*Elymus triticoides	Alkali Rye-grass	1111 1111 111	5	3	3	..	3	3
Festuca myuros	Rattail Fescue	1 1111 1111	1	1	1	..	1	1
*Festuca octoflora	Fescue	1111 1111 11	2	2	2	..	2	2
Holcus halepensis	Johnson Grass	1 1111 1111 1111 1	6	6	5	1	4	3
(Holcus halepensis sudanensis)	Sudan Grass (Cultivated)	1111 1111 1111	1	1	1	2	1	1
Koeleria cristata	Koeler's Grass	111 1111 1111	4	4	3	..	2	2
*Lolium multiflorum	Italian Rye-grass	1111 1111 1111	4	4	3	..	3	3
*Lolium perenne	English Rye-grass	1111 1111 1111 1111 1111 11	8	8	6	..	5	6
*Melica imperfecta	Melic Grass	1111 1111 111	1	1	1	.	1	..
Notholcus lanatus	Velvet Grass	1111 1111 1111 111	1	1	1	.	1	1
Phalaris lemmoni	Lemmon's Canary-Grass	111 1111 1	2	2	2	.	1	1
*Phalaris minor	Mediterranean Canary-grass	11 1111 1111	6	6	5	.	4	4
Phalaris paradoxa	Gnawed Canary grass	111 1111 1	1	1	1	..	..	..
*Poa annua	Annual Blue-grass	1 1111 1111 1	4	3	2	..	1	1
*Poa pratensis	Kentucky Blue-grass	1 1111 1111 1111 1111	5	5	3	..	2	2

THE MOST IMPORTANT HAY-FEVER PLANTS OF SOUTHERN CALIFORNIA

NAME

Names in italic type are plants of most importance based upon range of distribution (see counties), abundance and amount of pollen and ease of shedding pollen

* Most important hay-fever plants based upon *skin reactions*.

POLLINATING PERIODS

Each figure "1" represents one week *Bold* Face figures represent time of greatest pollination

DISTRIBUTION BY COUNTIES AND CITIES

Numbers indicate relative importance (scale 1-10 within a group, as III Grasses) based upon abundance of plants, proximity to centers of habitation and *amount of free pollen.*

GROUP I TREES

Scientific Name	Common Name	Pollinating Periods (Jan Feb Mar Apr May Ju Jul Aug Sept Oct Nov)	Los Angeles (Los Angeles, Pasadena, Long Beach, Pomona)	Orange (Fullerton, Anaheim, Santa Ana, Huntington B'ch)	San Diego (San Diego, Escondido, La Jolla)	Imperial (Imperial, Brawley, Holtville, El Centro, Calexico)	Riverside (Riverside, Elsinore, San Jacinto)	San Bernardino (San Bernardino, Redlands)
Acer macrophyllum	Big-leaf Maple	Mar 111, Apr 111	3	1	1	.	1	1
Acer negundo	*Box-Elder*	*111 11*	Street	Street			1	1
Alnus rhombifolia	White Alder	11 1111 11	2	.	1		2	2
(Betula alba)	White Birch (Cultivated)		1	.	..		.	..
Castanopsis sempervirens	Bush Chinquapin (Shrub)	1111 1111	1		1		2	2
(Celtis occidentalis)	Hackberry (*Cultivated*)	1 1111 1	Street		..			..
*Juglans californica	California Black Walnut	*111 11*	1	1			1	1
(Juglans regia)	*English Walnut* (Cultivated)	11 1111 111	10	9	3		4	4
*Platanus racemosa	Western Sycamore		5	5	1		1	1
*Populus fremontii	Fremont Cottonwood	11 1111 1	1	1		1	..	..
**Quercus agrifolia*	*Coast Live Oak*	. .11 1111	10	10	5	.		
Quercus chrysolepis	Maul Oak	1111 1	6	4	4		3	4
Quercus dumosa	Scrub Oak (*Shrub*)	11 1111 1	5	3	5	..	3	4
Quercus kelloggii	Black Oak	*1111 11*	3		1		3	3
Quercus wislizenii	Interior Live Oak	111 1111 11	4	1	2		2	2
		11 1111						

	Redscale	1 1111 1111 11	6	3	2		1	1
Atriplex rosea	Red Orache	11 1111 1111 1111 1111 1111 1	6	5	6	1	4	4
Chenopodium album	*Lambs Quarters*	1 1111 1111 1111 1111 111	5	5	5	..	2	2
Chenopodium ambrosides	*Mexican Tea*	1111 1111 1111 1111 1111 1111	2	2	2	1	1	1
Chenopodium murale	Nettle-leaf Goosefoot	1 1111 1111 1111 1111 1111 1111 1111 1111					5	6
		111 1111 1111 . .	7	6	6	..		..
**Franseria acanthicarpa*	*False Ragweed*	1111 1111 1111 1111 1111	2	2	1	..	1	1
		1111 1111 1	2			..	2	2
Franseria bipinnatifida		11 1111 1111 1111 1111	2	2	2		3	3
Franseria tenuifolia			3	3	3			
**Plantago lanceolata*	*English Plantain*	1111 1111 1111 1111 1111 1	1	1	1	.	..	.
Rumex acetosella	*Sheep Sorrel*	1111 1111 1111 1111 1					5	5
**Salicornia ambigua*	*Pickleweed*	11 1111 1111 1	8	1	8	..		..
**Salsola kali var tenuifolia*	*Russian Thistle*	11 1111 1111 1111 1111 1	1	1	1	--	..	1
			1	1	1	.		
Suaeda californica	*Sea Blite*	1 1111 1111 1111			1	4	..	..
Suaeda depressa erecta	Alkali Blite	1111 1111 1111 1111 1111	.					
Suaeda suffrutescens	Ink Bush	1111 1111	4	4	4	.	3	2
		1111 1111 111	6	6	4	..	4	3
Urtica gracilis var holosericea	Creek Nettle	1111 1111 1111 1111 1111 111	1	1	1	..	1	1
**Xanthium canadense*	*Cocklebur*	1111 1111 1111 1111 1111 .						
Xanthium spinosum	Spiny Clotbur							

GROUP II. GRASSES *(Continued)*

Scientific Name	Common Name	Jan	Feb.	Mar.	Apr.	May	Ju.	Jul	Aug.	Sept	Oct	Nov.	Los Angeles: Los Angeles, Pasadena, Long Beach, Pomona	Orange: Fullerton, Anaheim, Santa Ana, Hunting-ton B'ch	San Diego: San Diego, Escon-dido, La Jolla	Imperial: Imperial, Brawley, Holtville, El Centro, Calexico	River-side: Riverside, Elsinore, San Jacinto	San Bernar-dino: San Bernar-dino, Redlands
Polypogon mon-speliensis	Annual Beard-grass				11	1111	1111	1111	1				1	1	1	1	1	1
Sitanion jubatum	Big Squirrel-tail					111	1111						3	2	1	..	1	1
Stipa lepida	Small-flowered Stipa			1	1111	1111	1						2	2	2	.	1	1
Stipa pulchra	*Nodding Stipa*			1	1111	1111							2	2	2	..	..	..

GROUP III WEEDS

Scientific Name	Common Name	Jan	Feb.	Mar.	Apr.	May	Ju.	Jul	Aug.	Sept	Oct	Nov.	Los Angeles	Orange	San Diego	Imperial	Riverside	San Bernardino
**Amaranthus palmeri*	*Careless Weed*					111	1111	111							.	10	..	..
**Amaranthus retro-flexus*	*Rough Pigweed*				1	1111	1111	1111	1111	1111	1111		5	5	5	1	5	5
**Ambrosia psilostachya*	*Western Ragweed*						1	1111	1111	1111			6	6	6	..	4	4
**Artemisia californica*	*Coastal Sagebrush*								11	1111	11		8	7	4	.	3	3
**Artemisia dracunculus*	*Dragon Sagewort*						1	1111	1111	1111	11		2	2	2		3	2
**Artemisia tridentata and varieties*	*Sagebrush*								1	1111	1111	1	1	..	1	..	1	1
Artemisia vulgaris and varieties	*Mugwort*							1111	1111	1111	1111	1	10	9	8	1	8	8
*Atriplex argentea expansa	Silverscale						1111	1111	1				5	2	2	..	1	1
**Atriplex bracteosa*	*Bractscale*					1	1111	1111	111				6	4	3	..	1	1
Atriplex canescens	Wingscale					1	1111	1111	1111	1			1	1	2	1	1	1
Atriplex hymenelytra	Hollyscale		111	1111	111									.	1	1	1	1
**Atriplex lentiformis breweri*	*Lenscale*						11	1111	1111	1111			1	1	1		..	..
Atriplex lentiformis typica	*Lenscale*														..	5	1	1
Atriplex patula hastata	Spearscale								1	1111	1111		2	2	1	..		
*Atriplex polycarpa	Allscale						1	1111	1111	1			.		1	4	1	1

noted that *Hormodendrum* and *Alternaria* were most commonly observed, the former in 50% and the latter (*Alternaria*) 14%.

Since nothing new has been added by those who have made subsequent botanical surveys of this region, excepting pollen counts and mold studies, the author has utilized the surveys made by Piness, Miller, and McMinn, adding certain personal observations made since the original report.

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wide distribution, the amount of light pollen produced and the long duration of their pollinating periods. Several of these weeds begin pollinating in the spring and early summer and continue until late fall. About 96 species are included in this groups, the most important ones being the Amaranths, Chenopods (*Chenopodium*), Franserius (including false ragweeds), Western ragweed (*Ambrosia psilostachya*), Russian thistle (*Salsol kali*) and Sage brush (*Artemesia and sageworts*).

Mugworts (*Artemesia vulgaris* and subspecies) is perhaps one of the most frequent causes of late summer and fall types of hay fever. It is very common in the low ground and hills of the central and western parts of the region and pollinates profusely from early July to late September, often beginning in late June and continuing through October The pollen is very light and small. The Genus Atriplex is another group which contains species of wide range, producing abundant light pollen, and must be considered a very important factor in the summer and fall type of hay fever

The accompanying chart indicates the relative abundance and pollinating periods of the most important hay fever plants in Southern California.

Pollen counts of this region have been made by Stealy,[5] Harch,[2] Targow,[3] all of whom indicate that the counts are particularly low by comparison with the pollen counts in the regions east of the Rocky Mountains but the seasons are prolonger and overlapping However, despite the low pollen counts, there is no dearth of clinical pollinosis in this region. Our experience differs from that of Targow who believes that the symptoms in this region are less severe than in regions where there is a high pollen count.

Molds are of minor importance in this climate. The predominating organisms observed were *Alternaria* and *Hormodendrum*. Although *no clinical evidence of their being factors has* been observed, positive skin reactions have been obtained in a limited number of patients Targow[6] and Plunkett have studied fungus allergy in this region over a period of five years, they report having identified 60 odd genera and families. They too

noted that *Hormodendrum* and *Alternaria* were most commonly observed, the former in 50% and the latter (*Alternaria*) 14%

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34

Mexico

By M. SALAZAR MALLEN, M.D., F.A.C.A., F.A.C.P., F.A.A.A.

GEOGRAPHY. Mexico extends its 2,000,000 square kilometers between the Gulf of Mexico and the Caribbean Sea at the east, and the Pacific Ocean at the west and south Its northern borders touch Texas, New Mexico, Arizona and California, while on the south it borders on Guatemala and British Honduras.

Temperature. The Tropic of Cancer divides the country at 23°27′ N in two climatic zones. the Northern or Temperate and the Southern or Torrid. Nevertheless, owing to the presence of important chains of high mountains, temperature attains much diversity, resulting in the following general isotherms (Vivó[1]):

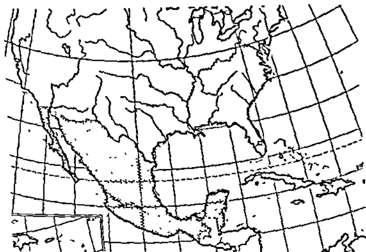
Zones lower than 1,000 meters have in general an annual isotherm less than 20° C, but this is only less than 25° C to the south of parallel 21°.

Zones from 1,000 meters and higher have an annual isotherm between 20° C and 15° C, but less than 15° C on the highest mountainous land

Temperature is rather even on the coastal zones south of parallel 20° N, the difference between the average temperature of the hottest and the coldest day being less than 5° C

The temperature of the interior and mountainous zones, between parallels 20° and 24° N, varies from 5 to 10° C, between 24 and 28° N from 10 to 15° C, and between 28 and 31° N from 20 to 25° C.

Humidity. Humidity is, in general, conditioned by the proximity to the coast and the movement of air currents from the upper atmosphere. Relative humidity data (from Vivó[1]) is as follows:



Humidity of 70% or more, along the coastal states south of the Tropic of Cancer.

Low humidity, less than 50%, along the Sonora (northwest) plateau and on the center of Baja California.

Amounts ranging between 50 and 70% in the rest of the country.

Rain. Rain (data from Vivó[1]) is, in general, scarce during the winter months, except in the northeast of Baja California and East of Meridian 100° W, where it reaches more than 25 mm. monthly and in some instances (Tabasco State) even 300 mm.

During July all the Mexican territory gets more than 25 mm. of monthly rain, but precipitation is more marked on the high mountain chains, the Mexican Plateau (this includes the Valley of Mexico, site of Mexico City) and the Southeastern States of Vera Cruz and Tabasco

Cloudiness. Cloudiness is most common in the states having more rain, as well as in the State of Chiapas—at the border of Guatemala—with some 150 clouded days a year. The Northeastern, the Central and Western States, as well as the Southern Zone of the country have more than 90 clouded days. The minimum of clouded days is seen on the North of Baja California (30 a year) and on the northern part of the Mexican Plateau, where the number of clouded days reaches only 60

Population. The population changes considerably from place to place, according to the climate, economic and cultural conditions. There are isolated zones where Indians predominate and form almost pure-bred Indian communities or tribes This occurs in some Southern States (Guerrero and Oaxaca) as well as in some Eastern and Southeastern States (Campeche, Yucatan and Chiapas respectively) The Indian inhabitants of these States, together with some other Indian groups inhabiting different regions yield a total of some 7,500,000 individuals. Nevertheless, the majority of the inhabitants of the country (14,000,000) are of mixed blood, with a higher Indian component and a lesser Spanish one (non-Spanish or Asiatic blood may also be present, though it occurs very seldom).

Predominance of European blood is found only in approximately 2,200,000 persons.[1]

CLINICAL ALLERGIES

Pollen and Pollinosis. A thorough botanical survey of the country was made by J. Cueva and F. Martinez[2] and special pollen studies of several representative Mexican localities have already been published by Canseco,[3] by Blackaller[4] and the

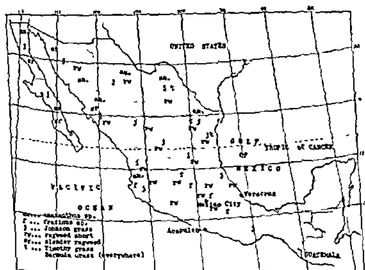


Fig 1

author[5] The Mexican Society of Allergists expects to complete in the near future a map of the pollen seasons and the average pollen concentrations of at least each State Capital To date it can be stated that there are good pollen studies of Mexico City,[3] Monterrey and Tampico,[3] and Guadalajara[4] and partial surveys of Sonora (Valle del Yaqui)[6] and Chihuahua.[7] Figure 1 is taken from Cueva's work and points out the distribution of the most important allergenic grasses and weeds

In Mexico City, the pollen seasons are the following ones:

The tree season, dominated by the presence of ash *(Fraxinus spp.)* pollen, clinically beginning in December (Christmas and New Year's hay fever and asthma) and lasting to the end of February. Other trees such as cedar *(Cupressus spp)*, alder *(Alnus spp.)*, poplar *(Populus spp.)* and oak *(Quercus spp)* are of little or secondary importance during this season. In early spring and up to May the pepper tree *(Schinus molle)* produces a few cases of respiratory symptoms.

Fig. 2

The grass season begins just when the ash season ends and reaches its highest intensity in May and at the end of summer after the rainy season (July and August).

Our botanical and pollen studies have led us to consider Bermuda grass *(Cynodon dactylon)*, which grows in profusion either wild or cultivated, as the only important allergenic grass for this area

Figure 2 shows that the grass pollens concentration is far from being high (highest pollen concentration never above 10 grams per square centimeter on 24 hours exposure—Figure 2), although allergy to Bermuda grass is as common in Mexico City as that due to ash, tending to express itself as spring and summer hay fever.

When we started our practice in 1936, we made routine tests with the following grass pollens: Bermuda, Johnson, timothy and lawn grass *(Lolium perenne)*, finding that even though there was a tendency to obtain cross reactions covering all gramineae tested, the inhabitants of Mexico City reacted in many instances to only Bermuda grass.

3 Our weed season is short and less important, and it is represented by Short ragweed pollen allergy (early July to September) and secondarily by two entomophilic plants. Cosmos and Sunflower *(Helianthus spp)* Our ragweed plants grow fairly well but sparingly in empty yards, thus giving much lower concentrations than those recorded in the United States Ragweed hay fever is therefore only sporadically seen in Mexico City and is not as important as that caused by ash and Bermuda grass pollens We are under the impression that because of the very low concentration of ragweed pollen in the atmosphere of Mexico, cases of asthma due to its inhalation are only rarely seen

Outside of Mexico City pollen allergy is of importance in the northern part of the country, but loses clinical interest south of the Mexican Plateau The following geographical division of the country may give a rough idea of the pollinosis problem outside of Mexico City.

a Central Zone that includes the following States· Aguascalientes, Guanajuato, Hidalgo, Jalisco, Mexico (state of), Michoacan, Morelos (Capital Cuernavaca, the well known tourist resort), Puebla, Queretaro and Tlaxcala The situation in regard to pollens and pollinosis is similar to that of Mexico City

b The Northwestern Zone, including Baja California, Sonora, Sinaloa and Nayarit, has very allergenic grasses and weeds that seem to cause a great deal of respiratory symptoms

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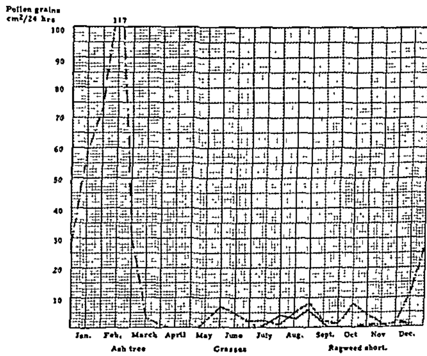


Fig. 2

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d The Eastern Zone (Gulf of Mexico and Yucatan) and the South Pacific Zone do not seem to be very important from the standpoint of pollinosis. Their hot climate, sometimes giving place to tropical exuberance, does permit the growing of some allergenic plants, such as Bermuda grass and short ragweed, but on account of conditions closely related to the high degree of atmospheric humidity, pollen does not seem to remain in the air long enough to be allergenically important.

Allergy from Air-borne Fungi. This matter has been thoroughly studied, for Mexico City by Gonzalez Ochoa and Orozco[3] and for the Northern zone by Canseco.[2] Gonzalez Ochoa and Orozco give the following figures for the isolated genera:

Genus	Percentage
Hormodendrum	17 7
Penicillium	16 6
Mycelia Sterilia	12.5
Alternaria	9 3
Yeasts	8 3
Mucor	6 2
Fusarium	6 2
Non-determined ascomycetes	6 2
Rhizopus	3 1
Aspergillus	3 1
Actinomyces	2.1
Dicoccum	2 1
Cephalosporium	2 1
Others (*Botrytis, Helminthosporium, Septonema, Acrothecium, Coniosporium, Cephalotecium,* etc)	4 1

There was not a marked seasonal incidence of any of the fungi, such as has been stressed by Bernstein and Feinberg,[4] but the authors noticed some slight tendency to obtain more colonies during spring and summer.

In our practice we test with extracts of *Alternaria, Aspergillus, Candida, Hormodendrum, Mucor, Penicillium* and *Rhizopus.*

Other Causes of Respiratory Allergy. In Mexico, dusts in general and house dust in particular appears to be second to pollen in clinical importance. The dust from the streets and

Due to the lack of the corresponding pollen studies, an accurate image of the allergy problem for this area cannot be given at the present time, but we are aware of the existence of cases due to Bermuda and Johnson grasses, to pigweeds (*Amaranthus hybridus* and *retroflexus*), to false ragweed (*Franseria*

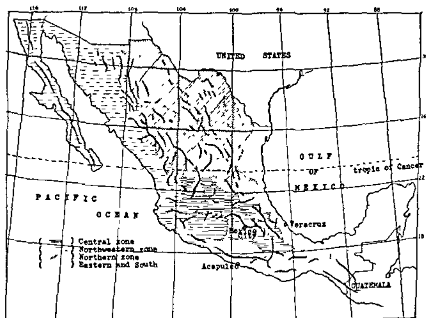


Fig 3

tenuifolia) and to western ragweed (*Ambrossia psylostachia*) in this zone.

c. The Northern Zone embraces the States of Coahuila, Chihuahua, Durango, Nuevo Leon, San Luis Potosi and Zacatecas. Good pollen studies have been made of Nuevo Leon and Tamaulipas[3] pointing to a rather rich allergenic flora The allergenic grasses are in order of importance Johnson, Bermuda and timothy, the allergenic weeds are several *Amaranthaceae*, *Chenopodiaceae*, Short ragweed, false ragweed and *parthenium* Canseco stresses the allergenic role of Privet (*Ligustrum*) in Nuevo Leon (Monterrey) and Mesquite (*Prosopis*) in Coahuila, Nuevo Leon, San Luis Potosi and Tamaulipas.

American cuisine (corn as in "tortillas," peppers of very many different kinds, tropical fruits such as *mango, mamey, guayaba, papaya, zapote*, etc.)

Corn is an important allergen in Mexico and in some cases contributes to the development of respiratory or cutaneous allergy. Beans—black or brown beans—are also important as allergens, indeed, we often see cases of sensitivity to the whole group of *leguminosae* (beans, lima beans, sweet peas, string beans and pig peas), which may manifest themselves by cutaneous or respiratory symptoms.

Tropical fruits do not seem, according to our experience, more allergenic than other fruits in general In fact, excepting mango fruit, which has been the cause of severe contact dermatitis in three cases, and of acute oedema of the glottis in two, we do not consider our tropical fruits outstanding as allergens.

Pepper or pepper-containing meals are perhaps of importance not so much as allergens but rather as primary irritants of the gastrointestinal mucosa One often sees strong gastric and colonic reactions (such as pyrosis, burning and diarrhea) determined by the ingestion of *chile* (peppers), in these cases it is interesting to note the remarkably great sensitivity of some individuals and the almost incredible tolerance of others.

As everywhere, we find cases of infantile dermatitis caused (1) by milk and (2) by chocolate, wheat and the cereal group Much to our discomfort, we have not been able to find a palatable milk substitute and therefore the management of babies with milk allergy presents us with considerable difficulties.

In headaches suspected to be of allergic origin, we eliminate, in this order, milk, chocolate, wheat, corn and egg.

The problem of altitude in relation to allergy. There is a widespread belief that allergic conditions should be rare in Mexico City and other towns that enjoy the same altitude (2,240 meters above sea level) However, we have found every variety of allergic syndrome in our local institutional and private practice We therefore feel that not the altitude *per se*,

country is known as an important cause of allergic respiratory symptoms in the Northern dry zones, while house dust, of course, is an important allergenic factor almost everywhere. We have often found cases of allergy due to grain dusts in farmers or in individuals living in contact with farming products, and have also seen allergies due to the inhalation of dusts contaminated with mites and with insect scales.

In Mexico City house dust is probably the most important allergenic cause of respiratory allergies. Outside of the cities we suspect that "house dusts" may in some cases contain specific components related to local allergens (grains, insects or insect debris, scales, house fungi, etc).

Feathers are also important as a cause of allergy, and one also finds cases of allergy to kapok (pochote) and to wool.

The problem of hay fever and asthmatic symptoms that are strictly regional and whose cause has not yet been well determined. While it is true that we are still lacking much important information about the distribution of the allergenic pollen of Mexico, we have encountered zones of "regional allergy" which is apparently not related to pollens They include States along the Gulf of Mexico (and more particularly the towns of Veracruz, Cordoba and Orizaba) from Matamoros (bordering on Brownsville, Texas) to Merida (State of Yucatan), where they produce a high incidence of rhinitis and bronchial asthma

Symptoms prevail during the winter months, but most patients relate the onset of their attacks to definite meteorological conditions, such as north winds or damp weather. The majority of these patients show positive skin reactions to extracts of environmental or atmospheric molds and improve under specific treatment. We are about to engage in a systematic survey of the airborne fungi and perhaps of airborne bacteria (Frouchtman[10]) in these damp, pollen-free coastal regions

Food as an Allergenic Cause. The eating habits of the Mexicans show marked local variations Our food is much more varied than that of the people of the United States and includes many ingredients that are usually absent in the North

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but rather the poor growth of some highly allergenic plants, together with the little allergic constitutional predisposition of our Indian and Indian-mixed population, is the major factor in the lower incidence of hay fever in Mexico City. In a recent study Baker[11] holds the view that altitude makes children more prone to develop allergic symptoms. She mentions, as an example, that imported canned foods that produce allergic symptoms in Mexico City fail to do harm when eaten in the United States. While experimental evidence exists showing the effect of altitude on anaphylactic shock, we believe in this particular instance that the change in the intestinal flora associated with a given location (contamination through hands, drinking water and so on) might simulate allergic symptoms It is known that colitis is an almost universal occurrence to aliens visiting Mexico City, even though most visitors are trying to avoid infection through food.

Treatment of Allergies in Mexico. This final paragraph may seem irrelevant, since one might assume that allergists in Mexico use the same therapeutical procedures employed elsewhere. *Hyposensitization is performed where feasible* In addition, however, we tend to use—more often, perhaps, than our North American colleagues—therapeutical methods that are either considered of little use or obsolete. Thus we resort, for example, to the use of gold salts in stubborn cases of bronchial asthma, of precipitated sulphur injections in chronic dermatitis found otherwise difficult to handle, of food propeptans (Delare's) in cases of food sensitivity where avoidance is difficult, and of urinary proteoses (Oriel's) in patients with sensitivity to light We are aware of the heterodoxy of our procedures for our immunologically minded colleagues, but they have been of much help when the use of the more accepted therapeutical methods have failed.[12]

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Appendix

RAGWEED POLLEN INDEX
for the
United States and Adjacent Areas
(Revised March, 1954)

The index figure for each community is based on three factors which directly affect individual pollen exposure: length of season, maximum arial concentration of pollen, and total pollen catch on test slides throughout the season

Any city or community having an index
- above 10 is not recommended
- between 5 and 10 is fairly good
- below 5 is good
- below 1 is excellent

Figures in ( ) are calculated from incomplete data.

* Indicates possible exposure to sagebrush pollen.

ALABAMA	
Birmingham	(49)
Foley	1
Mobile	8
ALASKA	
Fairbanks	0
Juneau	0
Nome	0
ARIZONA	
Grand Canyon National Park	
*North Rim (Fall only)	0.15
*South Rim (Fall only)	0.12
Phoenix (Fall only)	0.21
Tucson (Spring)	8
Tucson (Fall)	1
ARKANSAS	
Little Rock	62
West Memphis	(81)
CALIFORNIA	
Alpine	3
Arcata	3
El Centro	1
Escondido	1
Lassen Volcanic National Park	0.03
Los Angeles (Spring)	0.21
Los Angeles (Fall)	0.6
Monterey	0.24
Oakland	0.2
Pasadena	0.68
Sacramento	0.2
San Diego	1
San Francisco	0.2
Santa Barbara	3
Sequoia National Park	0.03
*Yosemite National Park	0.3
COLORADO	
Burlington	(23)
Colorado Springs	27

Kansas City	(101)
Wichita	73

KENTUCKY

Covington	(122)
Lexington	117
Louisville	102
Trappist	86

LOUISIANA

New Orleans	43
Tallulah	(33)

MAINE

Alfred	15
Allagash	1 4
Auburn	13
Augusta	9
Bar Harbor	5
Bethel	1 6
Belfast	1 3
Boothbay Harbor	5
Camden	9
Deblois	1
Eagle Lake	2
Eastport	6
Enfield	1
Grand Lake Stream	1 4
Greenville Junction	0 35
Houlton	3
Jackman	4
Kineo	27
Lincoln	2
Machias	4
Macwahoc	0 46
Millinocket	0 38
Newagen	1
Newport	3 5
New Portland	1
North Augusta	10
Oquossoc	2
Orono	10
Poland Spring	12
Portland	21
Presque Isle	0 44
Quoddy Head	0 6
Rangeley	9
Rockland	8
St Francis	0 09
Southport	8
Speckle Mt	2
Stonington	12
Upper Dam	2
York	8

MARYLAND

Annapolis	32
Baltimore	44
Bethesda	65
Frederick	82
Perry Point	65
Takoma Park	(41)

MASSACHUSETTS

Amherst	25
Boston	17
Nantucket	9
Newton Center	44
Northampton	20
Winchester	19
Worcester	9

MICHIGAN

Alpena	20
Ann Arbor	121
Bad Axe	40
Baldwin	41
Bay City	72
Benton Harbor	110
Big Rapids	57
Blaney	16
Boyne City	35
Cadillac	31
Charlevoix	21
Cheboygan	23
Coldwater	190
Copper Harbor	5
Crystal Falls	14
Detroit	59
East Tawas	75
Escanaba	57
Flint	76
Frankfort	65
Gaylord	51
Gladwin	99
Grand Haven	90
Grand Rapids	126
Grand Traverse	37

Denver	25
*Glenwood Springs	0 8
Mesa Verde National Park	0.5
Pikes Peak	0 9
Rocky Mountain National Park	
*Estes Park	1
*Grand Lake	0 2

CONNECTICUT

Bridgeport	23
Fairfield	26
Hartford	54
New Haven	25
Sherman	13
Stratford	26
Waterbury	27

DELAWARE

Wilmington	(54)

DISTRICT OF COLUMBIA

Washington	41

FLORIDA

Bradenton	4
Clearwater	7
Coral Gables	2
Daytona Beach	3
Everglades National Park	4
Fort Lauderdale (Beach)	9
Fort Myers	0 19
Fort Pierce	5
Gainesville	21
Jacksonville	6
Key West	0 12
Live Oak	5
Melbourne	21
Miami	2
Miami Beach	0 26
Ocala	13
Orlando	3
Panama City	32
(Sunnyside Beach)	2
Pensacola	10
(Santa Rosa Island)	0 054
St Petersburg	1
Sebring	3
Tallahassee	6
Tampa	50
West Palm Beach	5
(Morrison Field)	31

GEORGIA

Atlanta	29
St Simons Island	77
Valdosta	4

IDAHO

*Boise	5
Moscow	(0 5)
Pocatello	5
*Sun Valley	0.3

ILLINOIS

Bloomington	89
Chicago	65
Decatur	114
East St Louis	(100)
Elgin	73
Evanston	78
Grayslake	63
North Chicago	86
Peoria	108
Rockford	96
Rock Island	113
Springfield	72
Streator	67
Urbana	76

INDIANA

Cicero	76
East Chicago	(64)
Evansville	135
Fort Wayne	103
Indianapolis	115
Jeffersonville	(102)

IOWA

Ames	87
Cedar Rapids	120
Council Bluffs	(148)
Des Moines	140
Iowa City	109

KANSAS

Goodland	23

New Ipswich	8
New London	5
North Conway	4
Ossipee	3
Peterboro	27
Pittsburg	2
Plymouth	4
Rochester	17
Rye	15
Warren	2
Weirs	9
Whitefield	2

NEW JERSEY

Atlantic City	30
Caldwell	88
Dover	21
Freehold	72
Maplewood	21
Marlborough	40
New Brunswick	55
Pitman	51
Sandy Hook	39
Teaneck	31
Trenton	26
Verona	33
Westwood	18

NEW MEXICO

Albuquerque	8
Roswell	4

NEW YORK

Metropolitan areas

Bronx	21
Brooklyn	24
Croton	29
Farmingdale	44
Fire Island, Ocean Beach	15
Flushing	31
Garden City	28
Huntington	44
Jamaica	35
Manhattan	25
Pomona	26
Rockaway	42
Staten Island	30
White Plains	27
Yonkers	38

Adirondack area:

Ausable Forks	20
Big Moose	6
Blue Mt. Lake	1
Chateaugay Lake	8
Chilson	6
Elk Lake	4
Fort Ticonderoga	21
Hague	16
Indian Lake	6
Inlet	8
Keene	5
Keene Valley	1
Keesville	26
Lake George	23
Lake Kushaqua	15
Lake Placid	10
Long Lake	4
Loon Lake	5
McColloms	6
McKeever	10
Mt. McGregor	18
Newcomb	7
North Creek	20
Northville	27
Old Forge	11
Owl's Head	9
Paul Smiths	6
Port Henry	14
Raquette Lake	7
Redford	7
Sabattis	8
Santa Clara	15
Saranac Lake	20
Shroon Lake (Severance)	9
Speculator	10
Tupper Lake	8
Wanakena	8
Wells	13
Wilmington	16

Catskill area.

Big Indian	4
Fleischmanns	9
Haines Falls	5
Hunter	29
Phoenicia	14
Pine Hill	3
Pine Hill (Funcrest)	2

Grayling	52
Harbor Bay	61
Hillsdale	78
Houghton	9
Ironwood	17
Isle Royale National Park	2
Lake City	33
Lansing	94
Ludington	60
Mackinac Island	19
Mackinaw City	13
Mancelona	39
Manistee	54
Manistique	12
Marquette	12
Menominee	37
Mt. Pleasant	74
Munising	16
Newberry	20
Northport	25
Ontonagon	13
Petoskey	30
Port Austin	107
Powers	21
Rogers City	19
Roscommon	21
St. Ignace	8
St Joseph	103
Sault Ste Marie	4
Stambaugh	24
Traverse City	39
West Branch	31

MINNESOTA

Duluth	44
Minneapolis	99
Moorhead	125
Rochester	88
Tower	*6*
Virginia	8
Winona	124

MISSISSIPPI

Biloxi	7
Vicksburg	33

MISSOURI

Kansas City	101
St. Louis	100

MONTANA

Glacier National Park:	
Belton	0.1
Many Glacier	0.1
Miles City	4
*West Yellowstone	0.2

NEBRASKA

Lincoln	63
North Platte	13
Omaha	148
Scottsbluff	38

NEVADA

Lake Mead (Hoover Dam)	
(March, April)	4
(Fall)	0.3
Reno	0.1

NEW HAMPSHIRE

Bath	3
Berlin	0.9
Bethlehem	5
Carrol	0.9
Charlestown	14
Claremont	7
Colebrook	1.4
Concord	7
Conway	3
Dixville	3
Dover	4
Errol	0.5
Exeter	26
Franklin	5
Groveton	2
Hampton	10
Hillsboro	5
Hinsdale	11
Holderness	5
Keene	7
Laconia	2.4
Lancaster	0.75
Lebanon	17
Lincoln	2
Littleton	2
Manchester	9
Moosilaukee	0.45
Nashua	29

New Ipswich 8
New London 5
North Conway 4
Ossipee 3
Peterboro 27
Pittsburg 2
Plymouth 4
Rochester 17
Rye 15
Warren 2
Weirs 9
Whitefield 2

NEW JERSEY

Atlantic City 30
Caldwell 88
Dover 21
Freehold 72
Maplewood 21
Marlborough 40
New Brunswick 55
Pitman 51
Sandy Hook 39
Teaneck 31
Trenton 26
Verona 33
Westwood 18

NEW MEXICO

Albuquerque 8
Roswell 4

NEW YORK

Metropolitan areas

Bronx 24
Brooklyn 24
Croton 29
Farmingdale 44
Fire Island
Ocean Beach 15
Flushing 31
Garden City 28
Huntington 44
Jamaica 35
Manhattan 25
Pomona 26
Rockaway 42
Staten Island 30
White Plains 27
Yonkers 38

Adirondack area.

Ausable Forks 20
Big Moose 6
Blue Mt Lake 1
Chateaugay Lake 8
Chilson 6
Elk Lake 4
Fort Ticonderoga 21
Hague 16
Indian Lake 6
Inlet 8
Keene 5
Keene Valley 1
Keeseville 26
Lake George 23
Lake Kushaqua 15
Lake Placid 10
Long Lake 4
Loon Lake 5
McColloms 6
McKeever 10
Mt McGregor 18
Newcomb 7
North Creek 20
Northville 27
Old Forge 11
Owl's Head 9
Paul Smiths 6
Port Henry 14
Raquette Lake 7
Redford 7
Sabattis 8
Santa Clara 15
Saranac Lake 20
Shroon Lake
(Severance) 9
Speculator 10
Tupper Lake 8
Wanakena 8
Wells 13
Wilmington 16

Catskill area.

Big Indian 4
Fleischmanns 9
Haines Falls 5
Hunter 29
Phoenicia 14
Pine Hill 3
Pine Hill (Funcrest) 2

Tannersville	11
Windham	28
Zena	11

Statewide.

Albany	49
Binghamton	31
Buffalo	59
Celeron	41
Cortland	37
East Berne	32
Elmira	43
Geneva	57
Gloversville	29
Hornell	34
Elsmere	49
Fallsburg	21
Jamestown	65
Kauneoga Lake	47
Liberty	15
Lockport	71
Lowville	20
Margaretville	17
Minnewaska	20
Montauk	5
Monticello	21
Newburgh	30
Olean	42
Oneonta	33
Oswego	35
Perry	114
Plattsburg	41
Remsen	40
Riverhead	70
Rochester	46
Schenectady	27
South Fallsburg	54
Springville	49
Syracuse	23
Utica	26
White Lake	67
Yulan	17

NORTH CAROLINA

Asheville	58
Charlotte	36
Great Smoky Mountains National Park. Newfound Gap	(4)
Hatteras	71
Raleigh	28

NORTH DAKOTA

Fargo	(125)

OHIO

Akron	100
Cincinnati	122
Cleveland	68
Columbus	75
Dayton	90
Toledo	125
Youngstown	70

OKLAHOMA

Fort Sill	(73)
Henryetta	(75)
Muskogee	85
Oklahoma City	73
Okmulgee	57
Pawhuska	31
Tulsa	65

OREGON

Crater Lake National Park	0 1
Portland	0 83

PENNSYLVANIA

Altoona	52
Broomall	40
Hatboro	48
McKeesport	95
Meadville	66
Philadelphia	54
Pittsburgh	90
Pittsburgh (Brentwood)	68

RHODE ISLAND

Block Island	31
Province	25

SOUTH CAROLINA

Charleston	11
Columbia	40

SOUTH DAKOTA

Aberdeen	17
Mobridge	10
Pierre	14
Rapid City	18
Sioux Falls	52

TENNESSEE

Great Smoky Mountains National Park:	
Headquarters	13
Newfound Gap	4
Johnson City	58
Knoxville	49
Memphis	81
Nashville	65

TEXAS

*Amarillo	41
Big Spring	5
Brownsville	24
Corpus Christi	30
Dallas	193
El Paso	15
Fort Worth	71
Galveston	36
Houston	68
San Antonio	13

UTAH

*Bryce Canyon National Park	0 9
Salt Lake City	8
Vernal	3
Zion National Park	0 7

VERMONT

Burlington	48

VIRGINIA

Alexandria	(41)
Charlottesville	35
Norfolk	54
Richmond	42
Shenandoah National Park	
Big Meadows	10
Headquarters	35

WASHINGTON

Mt Rainier National Park	
Longmire	0
Paradise Valley	0 1
White River	0 04
Olympic National Park	0 1
Seattle	0 03
Spokane	0 1
Walla Walla	5
Wenatchee	46
Wenatchee Valley Experiment Station	84

WEST VIRGINIA

Charleston	31
White Sulphur Springs	19

WISCONSIN

Eagle River	13
Madison	93
Milwaukee	86
Plum Island	40
Sheboygan	90
Superior	(44)

WYOMING

*Grand Teton National Park	0 1
Lander	23
Yellowstone National Park,	
*Mammoth	0 2

VIRGIN ISLANDS

St. Thomas	0 025

CANADA

ALBERTA

Banff	0
Beaver Lodge	0
Calgary	0 028
Coleman	0 028
Cypress Hills	0 012
Drumheller	1
Edmonton	0
Jasper	0
Lake Louise	0 009
Lethbridge	1
Manyberries	0.2
Medicine Hat	7
Vermilion	0
Waterton Lakes Park	0 012

BRITISH COLUMBIA

Saanichton	0 045
*Summerland	0

MANITOBA	
Branton	2
Dauphin	5
Morden	12
*Pierson	6
Riding Mountain National Park	0 155
Russell	1
The Pas	0.1
Winnipeg	8

NEW BRUNSWICK	
Bathurst	0.37
Campbellton	0 07
Chipman	2
Dalhousie	0 3
Doaktown	2
Edmunston	2
Fredericton	0 49
Fundy National Park	
Waterside	3
Haslam Farm	1 5
Gagetown	30
Jemseg	5
Moncton	3
Newcastle	0 17
Perth Andover	2
Pointe du Chene	25
Sackville	2
St Andrews	0 42
St George	2
St John	2
St. Stephen	3
Shediac Cape	1
Sussex	7
Welsford	3
Woodstock	1

NEWFOUNDLAND	
Corner Brook	0 09
St John's	0 24

NOVA SCOTIA	
Antigonish	0 45
Baddeck	0 18
Cape Breton Highlands National Park	0 31
Chester	0 09
Digby	0 36
Ingonish Island	0 39
Kentville	5
Meteghan	3
Middle West Pubnico	0.29
Truro	*0 21*
Yarmouth	5

ONTARIO	
Algonquin Park	12
Black Sturgeon Lake	2
Cedar Lake	5
Cochrane	2
Cornwall	29
Dorset	8
Georgian Bay Islands National Park	16
Hamilton	77
Honey Harbor	7
Huntsville	19
Kapuskasing	0.34
Kenora (Cedar Lake)	6
Lake Joseph	4
London	45
Mallory town	41
Mindemoya (Manitoulin Island)	8
North Bay	8
Ottawa (district)	17
Parry Sound	8
Peterborough	38
Point Pelee National Park	29
Port Arthur	7
Sault Ste Marie	4
St Lawrence Islands *National Park*	38
Toronto	53
Windsor	(59)

PRINCE EDWARD ISLAND	
Cavendish	0 5
Charlottetown	2
Mantague	0 23
O'Leary	1
Prince Edward Island National Park	0 43
Souris	*0 36*
Summerside	1
Tignish	0 45

QUEBEC

Berthierville	33
Cap-de-la-Madeleine	45
Carleton	0.8
Caughnawaga	61
Chandler	0.1
Charlesbourg	2
Dorval	74
Farnham	64
Father Point	1
Gaspé	0.2
Grande Riviere	0.2
Iles-de-la-Madeleine	0.1
Jonquieres, (Chicoutimi)	2
Lac-des Seize-Iles	11
Lennoxville	4
Matapedia	0.1
Mont-Albert Caspesie	0.1
Mont Joli	0.2
Mont-Laurier	5
Mont Tremblant	6
Montreal	68
New Carlisle	3
Nominingue	8
Normandin	3
Outremont	29
Perce	0.7
Point au Trembles	76
Pointe-Claire	32
Quebec	10
Rimouski	5
Riviere-du-Loup	4
Ste-Agathe	10
Ste-Anne-de-Bellevue	31
Ste-Anne-de-la Pocatiére	12
St-Jovite	6
St-Lambert	5
St-Martin	66
Sherbrooke	9
Tadoussac	0.36

SASKATCHEWAN

Prince Albert	0.1
Prince Albert National Park	0
Saskatoon	0.51
Swift Current	1

BERMUDA

Hamilton	0

CUBA

Havana	0.2

MEXICO

Matamoros	(24)
Mexico City	5
Tampico	4

Compiled by The Pollen Survey Committee of the Council on Aeroallergens of *The American Academy of Allergy*

MANITOBA

Branton	2
Dauphin	5
Morden	12
*Pierson	6
Riding Mountain National Park	0.155
Russell	1
The Pas	0 1
Winnipeg	8

NEW BRUNSWICK

Bathurst	0.37
Campbellton	0 07
Chipman	2
Dalhousie	0 3
Doaktown	2
Edmunston	2
Fredericton	0 49
Fundy National Park	
Waterside	3
Haslam Farm	1 5
Gagetown	30
Jemseg	5
Moncton	3
Newcastle	0 17
Perth Andover	2
Pointe du Chene	25
Sackville	2
St. Andrews	0 42
St. George	2
St John	2
St Stephen	3
Shediac Cape	1
Sussex	7
Welsford	3
Woodstock	1

NEWFOUNDLAND

Corner Brook	0 09
St. John's	0 24

NOVA SCOTIA

Antigonish	0 45
Baddeck	0 18
Cape Breton Highlands National Park	0.31
Chester	0 09
Digby	0.36
Ingonish Island	
Kentville	[illegible]
Meteghan	[illegible]
Middle West Pubnico	[illegible]
Truro	[illegible]
Yarmouth	5

ONTARIO

Algonquin Park	12
Black Sturgeon Lake	2
Cedar Lake	5
Cochrane	2
Cornwall	29
Dorset	8
Georgian Bay Islands National Park	16
Hamilton	77
Honey Harbor	7
Huntsville	19
Kapuskasing	0.3
Kenora (Cedar Lake)	6
Lake Joseph	4
London	45
Mallory town	41
Mindemoya (Manitoulin Island)	8
North Bay	8
Ottawa (district)	17
Parry Sound	8
Peterborough	38
Point Pelee National Park	29
Port Arthur	7
Sault Ste Marie	4
St Lawrence Islands National Park	38
Toronto	53
Windsor	(59)

PRINCE EDWARD ISLAND

Cavendish	0 5
Charlottetown	2
Montague	0 23
O'Leary	1
Prince Edward Island National Park	0 13
Souris	0 36
Summerside	1
Tignish	0.45

Index

This Book

REGIONAL ALLERGY OF THE UNITED STATES, CANADA, MEXICO AND CUBA

Edited by

MAX SAMTER, M.D., and OREN C. DURHAM

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